111th Congress, 2d Session – – – – – – – – – – – – House Document 111–129

LOUISIANA COASTAL PROTECTION AND RESTORATION (LACPR) REPORT

COMMUNICATION

FROM

THE ASSISTANT SECRETARY OF THE ARMY (CIVIL WORKS), THE DEPARTMENT OF THE ARMY

TRANSMITTING

NOTIFICATION OF THE FINAL TECHNICAL REPORT FOR LOUISIANA COASTAL PROTECTION AND RESTORATION (LACPR), PURSUANT TO PUB. L. 109–103 PUB. L. 109–148

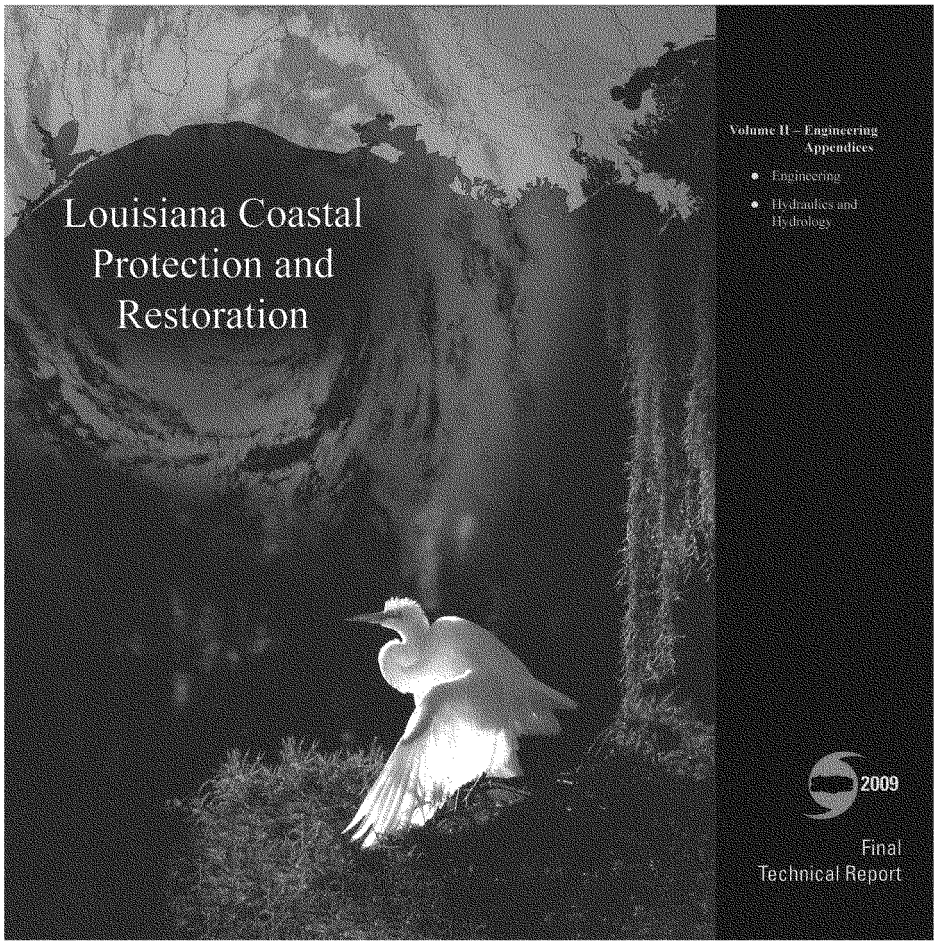
PART 3 OF 4

JULY 1, 2010.—Referred to the Committee on Transportation and Infrastructure and ordered to be printed

U.S. GOVERNMENT PRINTING OFFICE

57–264 WASHINGTON : 2010

AUTHENTICATED
U.S. GOVERNMENT
INFORMATION
GPO


Louisiana Coastal
Protection and
Restoration
Volume II – Engineering
Appendices
• Engineering
• Hydraulics and
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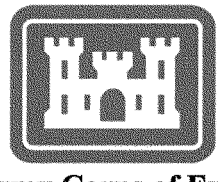
2009
Final
Technical Report

LOUISIANA COASTAL PROTECTION AND RESTORATION
FINAL TECHNICAL REPORT

EVALUATION RESULTS APPENDIX

June 2009



U. S. Army Corps of Engineers
New Orleans District
Mississippi Valley Division

Louisiana Coastal Protection and Restoration (LACPR) Final Technical Report
Evaluation Results Appendix

Purpose

The Louisiana Coastal Protection and Restoration (LACPR) Technical Report has been developed by the United States Army Corps of Engineers (USACE) in response to Public Laws 109-103 and 109-148. Under these laws, Congress and the President directed the Secretary of the Army, acting through the Chief of Engineers, to:

- Conduct a comprehensive hurricane protection analysis and design in close coordination with the State of Louisiana and its appropriate agencies;
- Develop and present a full range of flood control, coastal restoration, and hurricane protection measures exclusive of normal policy considerations for South Louisiana;
- Consider providing protection for a storm surge equivalent to a Category 5 hurricane; and
- Submit preliminary and final technical reports.

The purpose of this appendix is to provide a detailed and uniform presentation of evaluation results for the LACPR alternatives in the form of maps and tables as well as hurricane surge inundation maps by planning unit. The base and future conditions for LACPR are described in the main report. This appendix does not address the potential impacts to the Mississippi coast, which is included in the main report and the *Regional Considerations for LACPR and MsCIP Appendix*.

Water Surface Elevation and Depth Maps

In order to identify the extent of hurricane surge inundation, water surface elevation, water depth, and/or change in depth of flooding maps are included for the 100-year, 400-year, and 1000-year frequency events for the following conditions:

- **Base/Existing Conditions**
- **Future Conditions**
  - No Action/Degraded Coast
  - Maintain Coast
- **Comparison of Base and Future Conditions** (Planning Units 1 and 2 only)
  - Base vs. Future No Action
  - Future No Action vs. Maintain Coast

In Planning Units 1 and 2, a comparison of basic alternative performance (changes in depth of flooding) of primary structural alternatives is also presented through a series of maps (e.g., comparison of weir-barrier plan in Planning Unit 1 to high level plan; comparison of GIWW weir-barrier in Planning Unit 2 to ridge alternative).

In addition to developing the maps described above, the hydraulic analysis plays a key role in the evaluation of the LACPR alternatives. Each levee alternative affects the surge and the waves during a storm in a different way which leads to different residual risk/damages. For details on the methodology and results of the hydraulic analysis refer to Volumes I and II of the Hydraulics and Hydrology Appendix.

Performance Results by Alternative

As described in the main report, each LACPR alternative is evaluated on the basis of informed metrics and risk reduction performance. In order to display these results, the following maps and tables are provided by alternative:

- **Metric/Data Table** – provides a "thumbnail sketch" of each alternative's performance; includes results for each of the metrics across four future scenarios and as well as other performance data.
- **Alternative Map** – an aerial photograph providing the geographic location of features included in the alternative, e.g. structural levee alignments, coastal restoration diversions, nonstructural velocity zones, etc.
- **Water Surface Elevation Table** – shows the alternative's performance in reducing water surface elevations for selected planning subunits for the with and without project baseline and future conditions.
- **Planning Subunit Key Map** – corresponds with the water surface elevation table described above; also shows levee design heights for structural measures.

The appendix is organized so that when printed double-sided the metric/data table for a particular alternative can be viewed at the same time as the map of that alternative and the water surface evaluation table can be viewed at the same time as the planning subunit key map (when applicable).

Metric/Data Tables and Alternative Maps

Each **metric/data table** is organized in four sections as follows (from top to bottom): alternative description, results by scenario with uncertainty bands, other results, and residual risk/damages by frequency.

General Alternative Information

The top section provides the following general information about the alternative:

- Planning Unit
- Alternative Number, e.g. PU1-NS-100
- Category, e.g. coastal restoration + nonstructural measures
- Alternative Description
- Coastal Component, e.g. R2
- Nonstructural Component, e.g. 1000-year stand alone measures
- Structural Component, e.g. No new levees or increases in risk reduction for existing levees.

Results by Scenario with Uncertainty Bands

The section below the general alternative information provides the results by scenario with uncertainty bands for seven of the LACPR metrics:

- Life Cycle Cost
- Population Impacted
- Residual Damages

- Employment Impacted
- Archeological Sites Protected
- Historic Properties Protected
- Historic Districts Protected

Additional data is provided on impacts to the regional economy, i.e. gross regional output and earned income impacted.

The four scenarios represent two conditions of relative sea level rise (low and high) and two conditions of population growth (high employment/dispersed population growth and business-as-usual employment/compact population growth). Additional information on the four scenarios can be found in the main report.

The three levels of uncertainty—high, mid, low—represent relative high uncertainty, moderate uncertainty, and low uncertainty. For the economic metrics, these uncertainty levels correspond to the 10%, 50%, and 90% water levels. For example, the 90% water levels should only be exceeded in 10% of the cases, which indicates a low uncertainty (or high confidence) in the economic metric values. Alternatively, the 10% water levels may be exceeded 90% of the time, which indicates a high uncertainty (or low confidence).

The metric values represent the performance of each alternative over the period of analysis. Development of metric values required a statistical analysis of a range of storm surges to measure relative impacts of alternatives considered. This range of surges was applied equally to each alternative.

Note: Annual equivalent metric values shown for economic and cost metrics presented in this section are calculated for the period from 2010 to 2075 at the common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels.

Other Results

In the next section of the table, results are provided for the other three LACPR metrics:

- Construction Time
- Direct Wetland Impacts
- Indirect Environmental Impacts

In addition, information is provided on Federal and non-Federal cost components, spatial integrity (or landscape stability) of coastal restoration plans, and the percentage of wetlands predicted to remain after 50 and 100 years.

The coastal, nonstructural, and structural plan component costs are provided in this section as present values of life cycle costs rather than annual equivalents; the present value costs are calculated over the same period and for the same base year as described in the note above. The non-Federal share of costs is also provided (35% or more of the total cost). The color coding links all costs by scenario (yellow = scenario 1; green = scenario 2; blue = scenario 3; orange = scenario 4).

Residual Risk/Damages by Frequency Event

The bottom section of the table expresses residual risk as residual damages at year 2075 for the storm frequencies addressed in the economic analysis (10-, 100-, 400-, 1000-, and 2000-year). Low uncertainty values are provided for the four scenarios for both no action and with the alternative projects in place.

The square in the bottom right of the table contains a quick reference to the planning unit, type of alternative, and design level (level of risk reduction provided). The corresponding **alternative map** appears on the next page facing the metric/data table.

Planning Subunit Key Map and Water Surface Elevation Table

The **planning subunit key map** provides the location and designators for selected planning subunits within a planning unit for which sample performance data related to change in water surface elevations are provided. The planning subunits shown represent only a small subset of the over 900 planning subunits used in the overall analysis. This map is the key to the subunits listed in the water surface elevation table on the facing page. The planning subunit key map also specifies the levee heights by reach for each of the structural alternatives.

The **water surface elevation table** presents the base and future conditions for the 100-, 400-, and 1000-year frequency events for both with and without the alternative project in place. The two rows at the bottom of the table provide the basic assumptions that relate to the water surface results. These assumptions are the same for every water surface elevation table included in this appendix. The 90% confidence level is a statistically derived probability of the surge elevations. As previously explained, the 90% values denote a high confidence or low uncertainty. A "high" relative sea level rise rate was assumed and used in the calculations. The levee design and overtopping boxes capture the friction conditions used in the surge generating model, i.e. no friction waves.

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		Alternative Map	45
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	Water Depths - 100-year Event - 2010 Base Conditions	3
	Water Surface Elevations- 400-year Event - 2010 Base Conditions	4
	Water Depths - 400-year Event - 2010 Base Conditions	5
	Water Surface Elevations- 1000-year Event - 2010 Base Conditions	6
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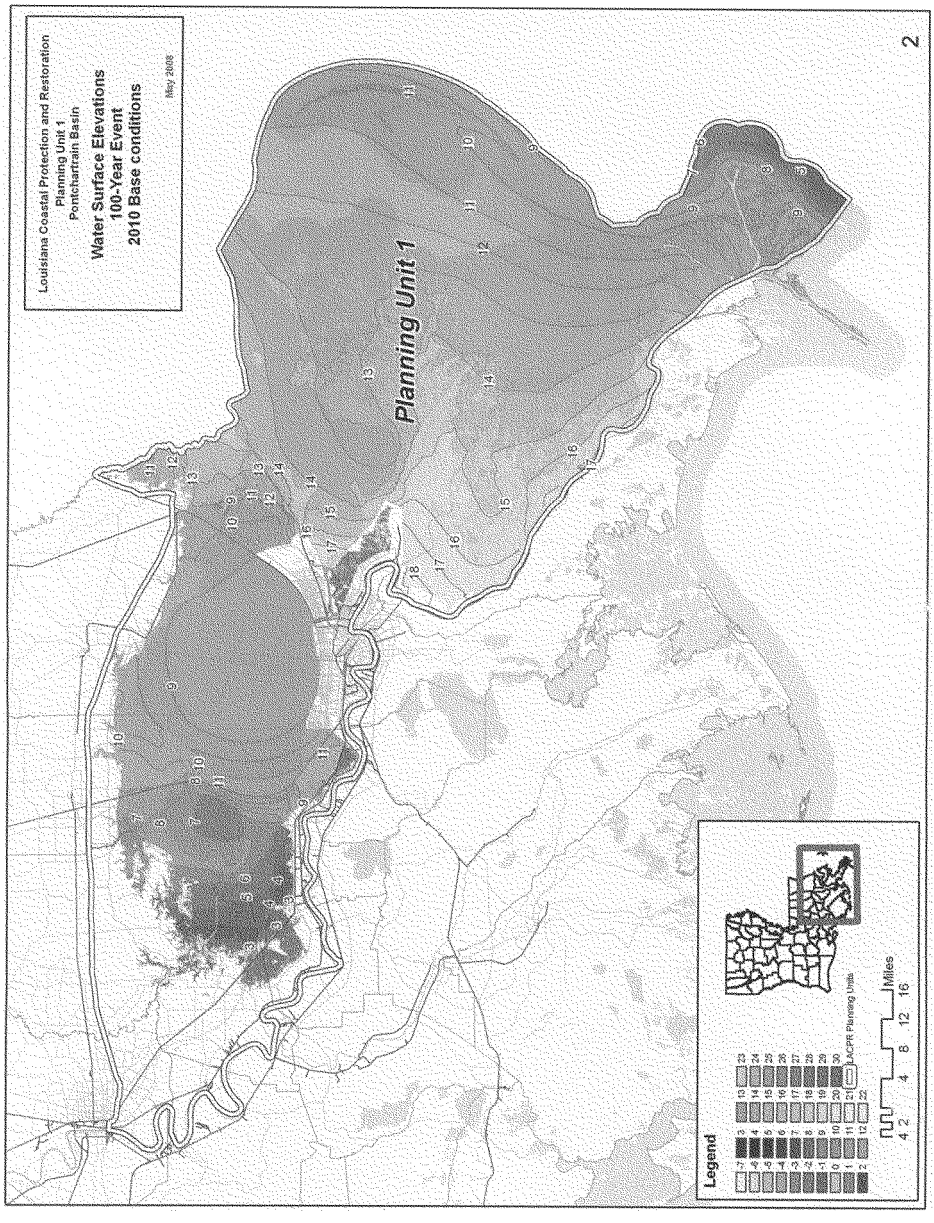
		Alternative Map	67
PU4-C-RL-1000-1		Metric/Data Table	68
		Alternative Map	69

Planning Unit 1


Louisiana Coastal Protection and Restoration
Planning Unit 1
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Water Surface Elevations
100-Year Event
2010 Base conditions
May 2008
Planning Unit 1
Legend
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Miles
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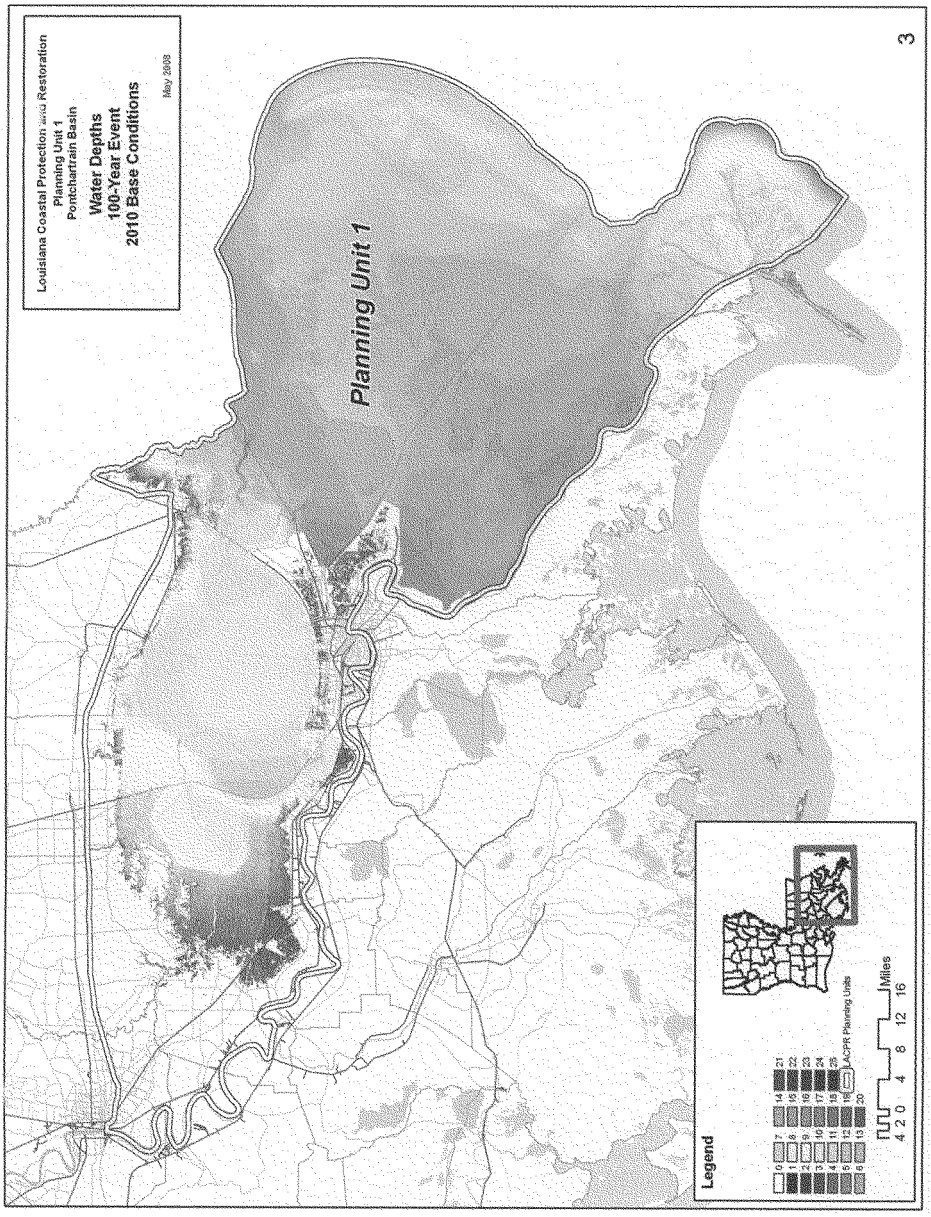
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2010 Base Conditions
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LACPR Planning Units
Miles
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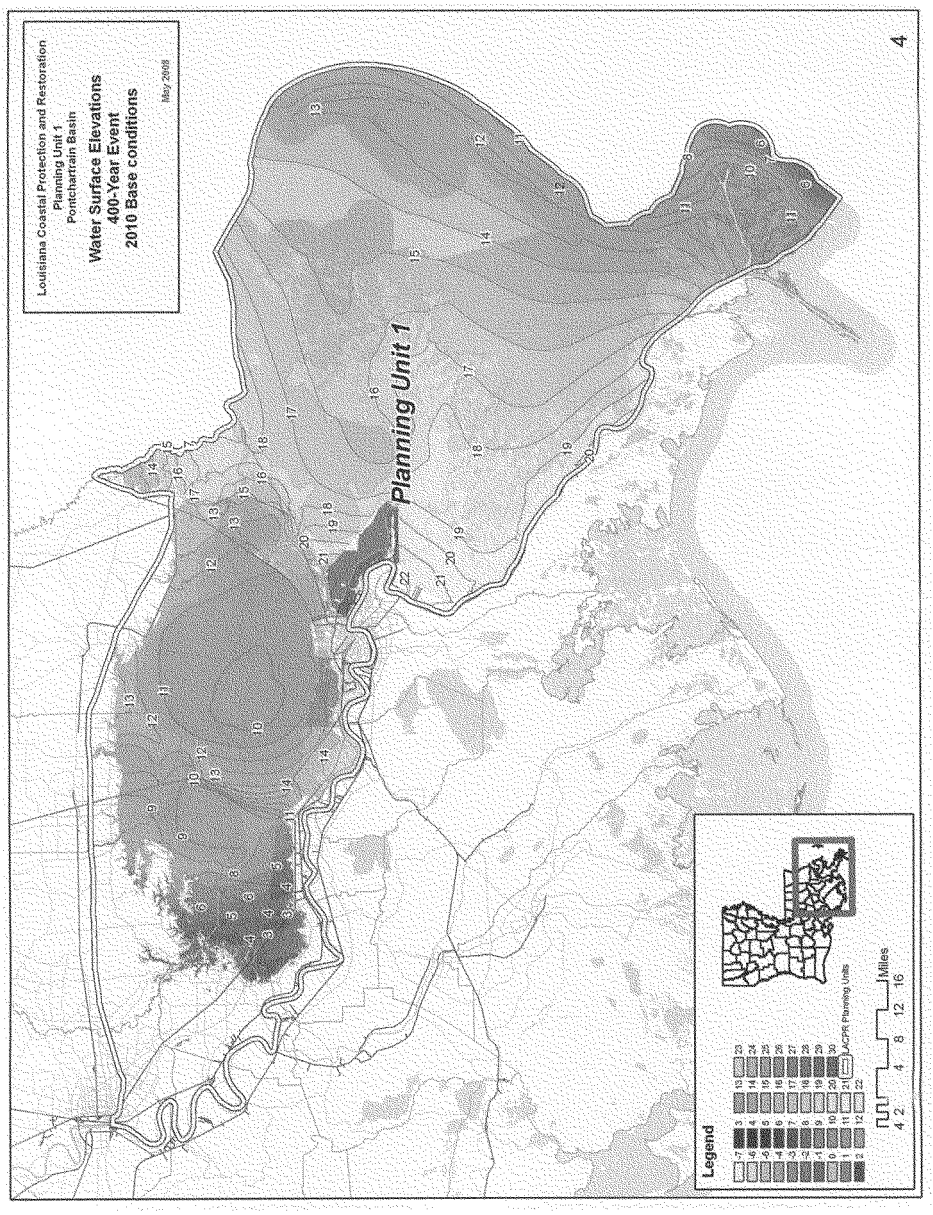
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May 2008
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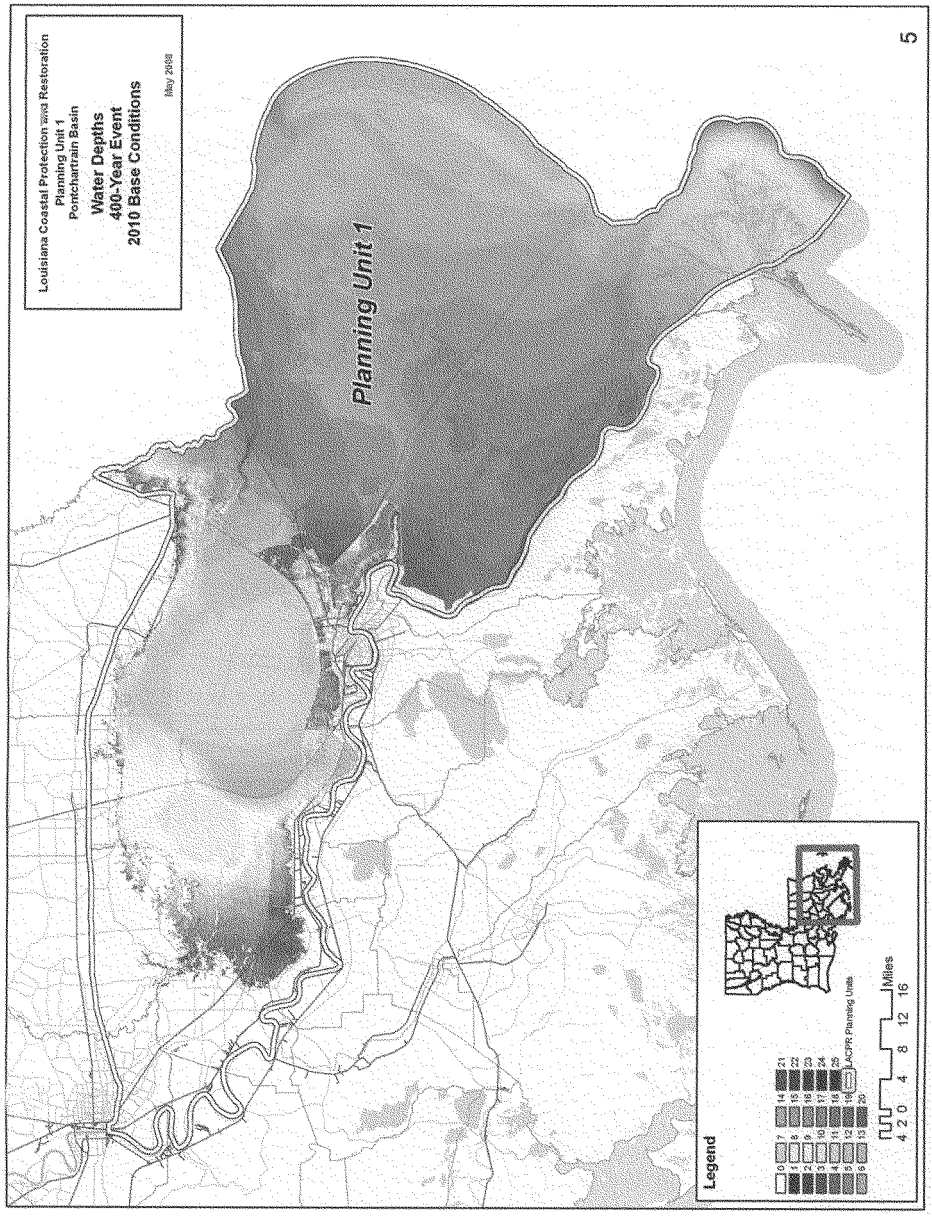
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Pontchartrain Basin
Water Depths
400-Year Event
2010 Base Conditions
May 2008
Planning Unit 1
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Miles
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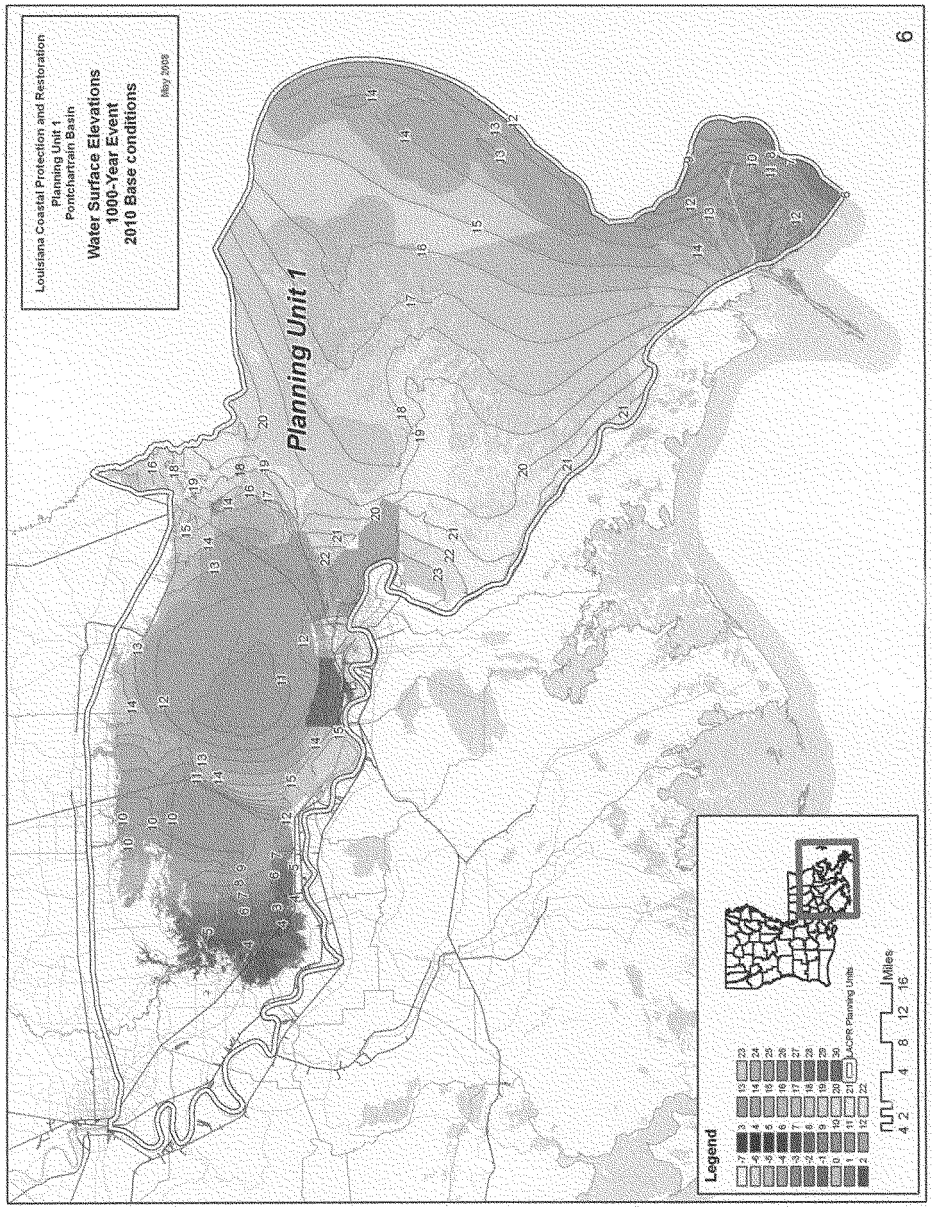
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Planning Unit 1
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100-Year Event
2010 Base conditions
May 2008
Planning Unit 1
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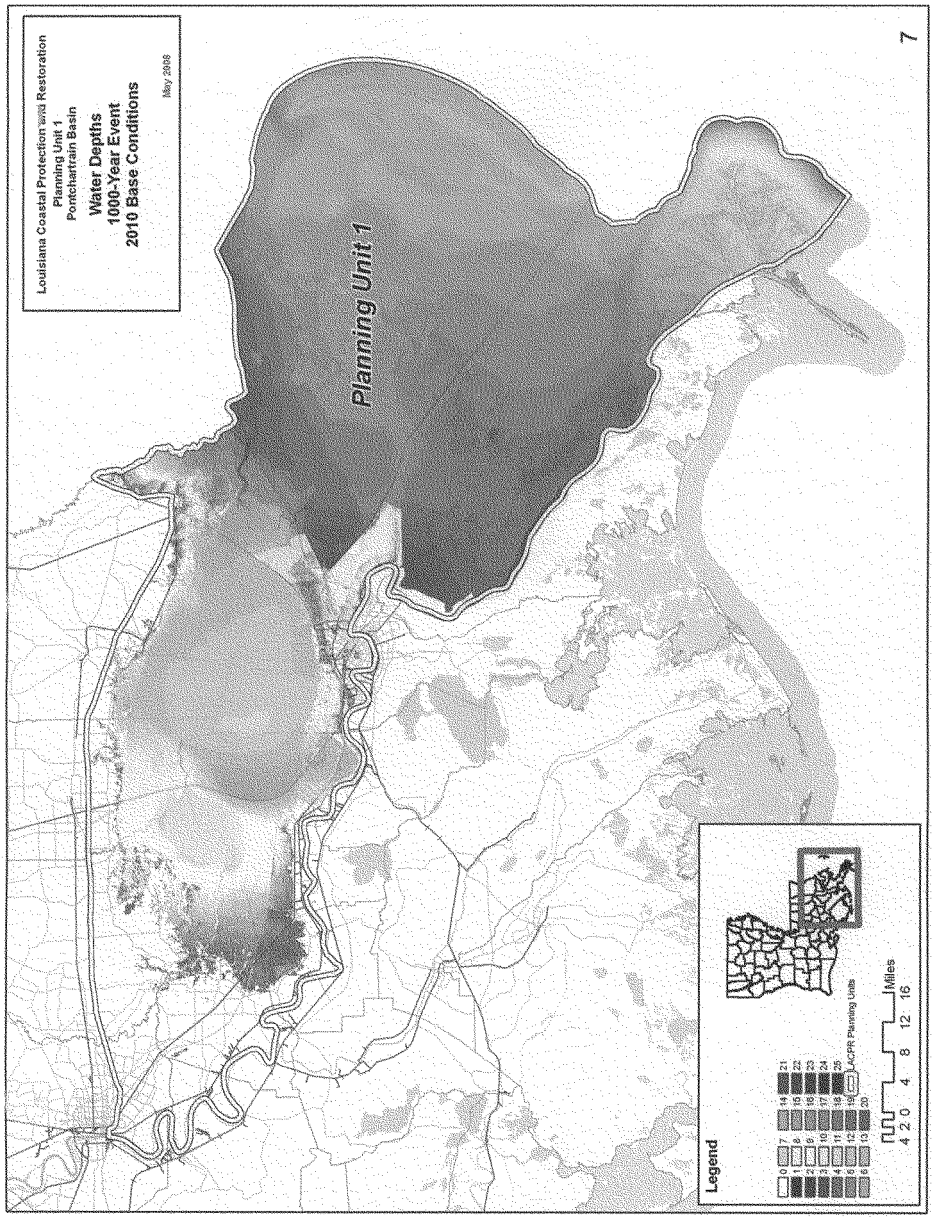
Louisiana Coastal Protection and Restoration
Planning Unit 1
Pontchartrain Basin
Water Depths
1000-Year Event
2010 Base Conditions
May 2008
Planning Unit 1
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Miles
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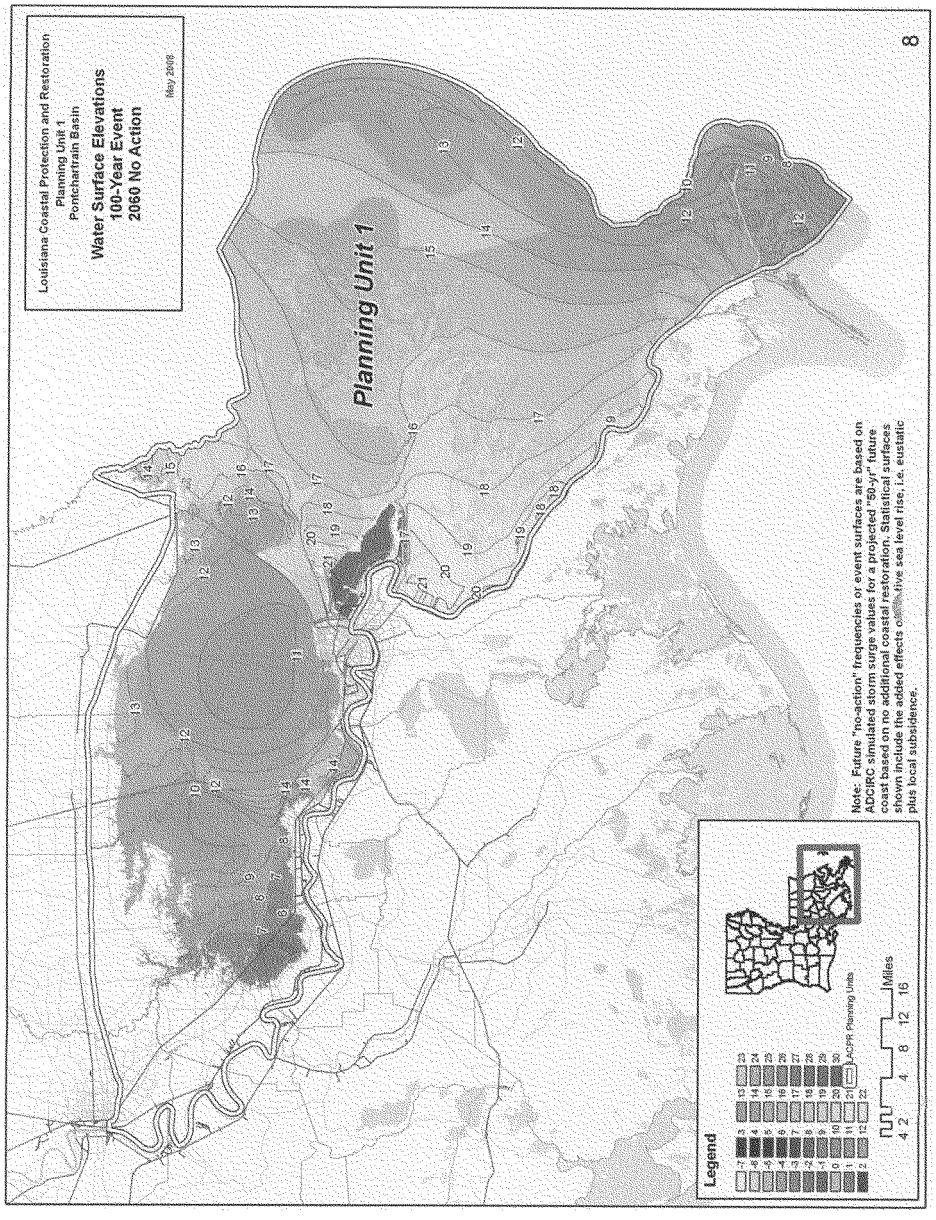
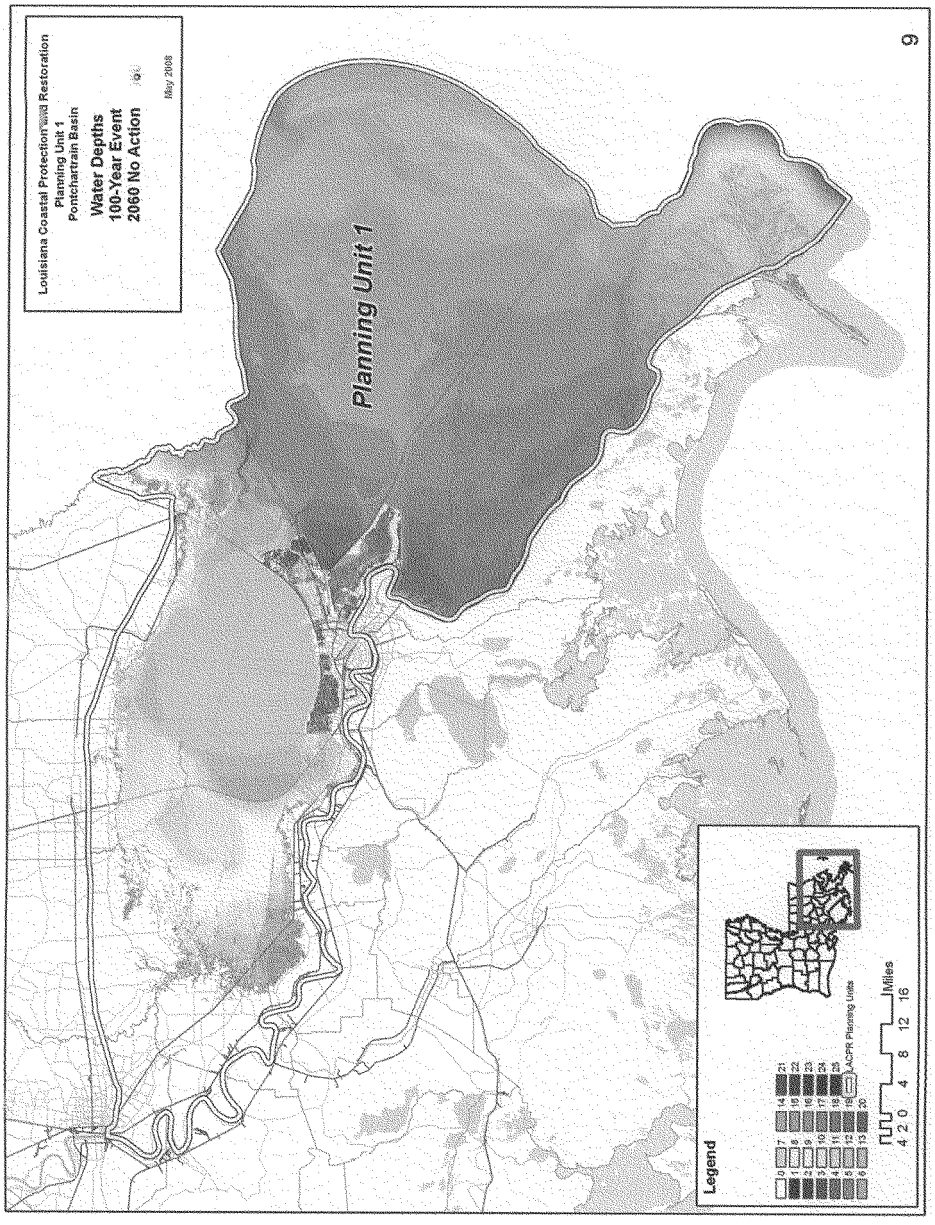

Louisiana Coastal Protection and Restoration
Planning Unit 1
Pontchartrain Basin
Water Surface Elevations
100-Year Event
2060 No Action
May 2008
Planning Unit 1
Legend
Miles
4 2 4 8 12 16
Note: Future "no-action" frequencies or event surfaces are based on ADCIRC simulated storm surge values for a projected "50-yr" future coast based on no additional coastal restoration. Statistical surfaces shown include the added effects of relative sea level rise, i.e. eustatic plus local subsidence.
8


Louisiana Coastal Protection and Restoration
Planning Unit 1
Pontchartrain Basin
Water Depths
100-Year Event
2060 No Action
May 2008
Planning Unit 1
Legend
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Miles
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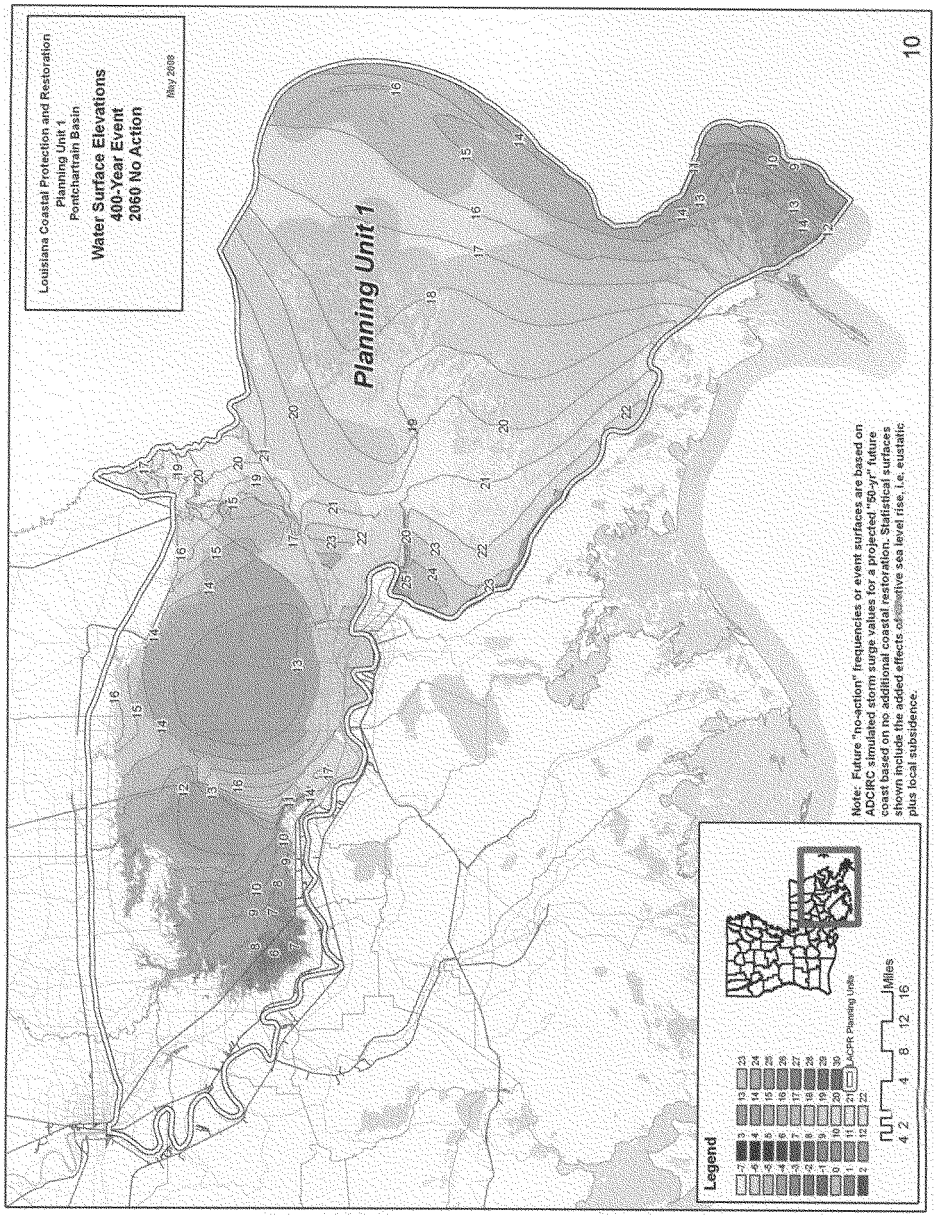
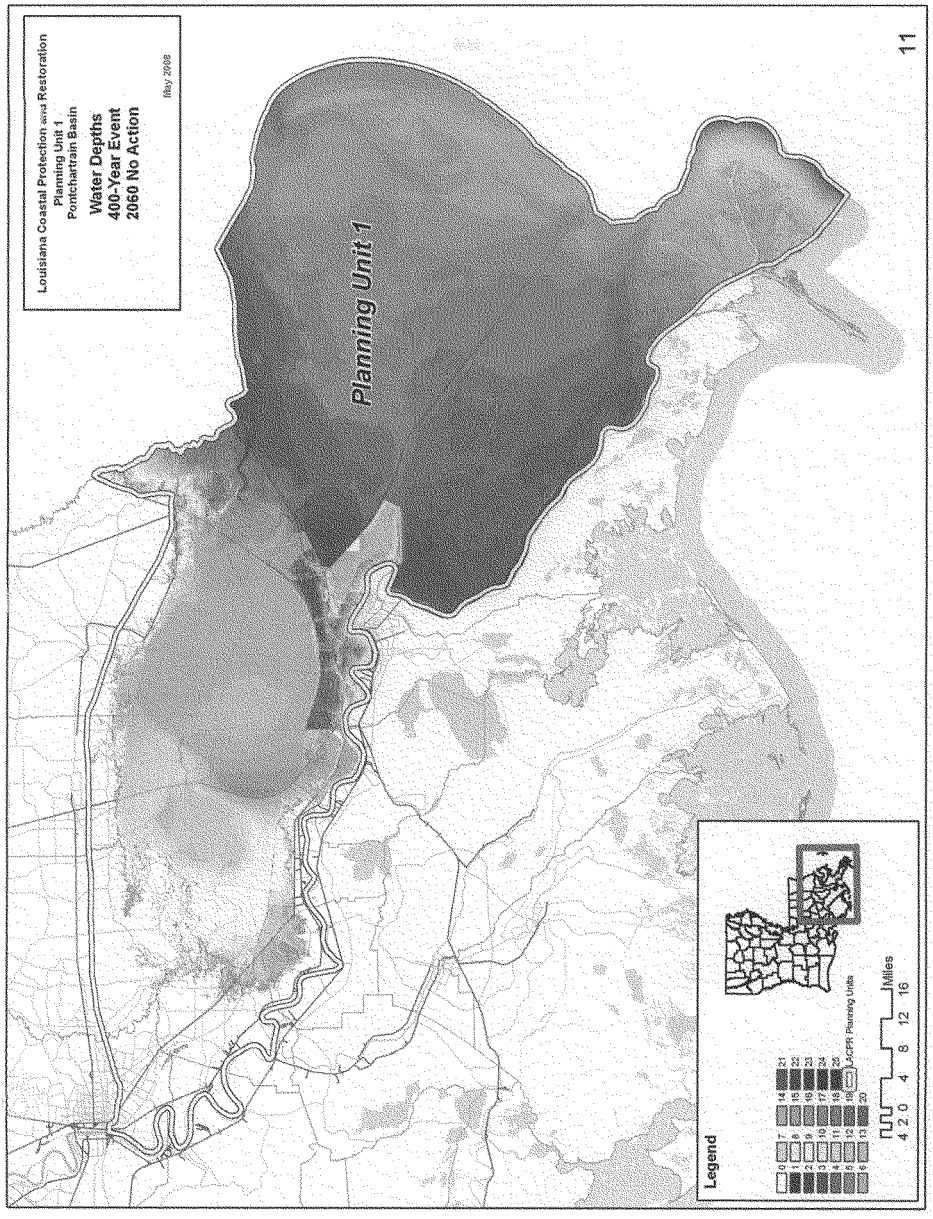

Louisiana Coastal Protection and Restoration
Planning Unit 1
Pontchartrain Basin
Water Surface Elevations
400-Year Event
2060 No Action
May 2008
Planning Unit 1
Legend
LACPR Planning Units
Miles
4 2 4 8 12 16
Note: Future "no-action" frequencies or event surfaces are based on ADCIRC simulated storm surge values for a projected "50-yr" future coast based on no additional coastal restoration. Statistical surfaces shown include the added effects of relative sea level rise, i.e. eustatic plus local subsidence.
10


Louisiana Coastal Protection and Restoration
Planning Unit 1
Pontchartrain Basin
Water Depths
400-Year Event
2060 No Action
May 2008
Planning Unit 1
Legend
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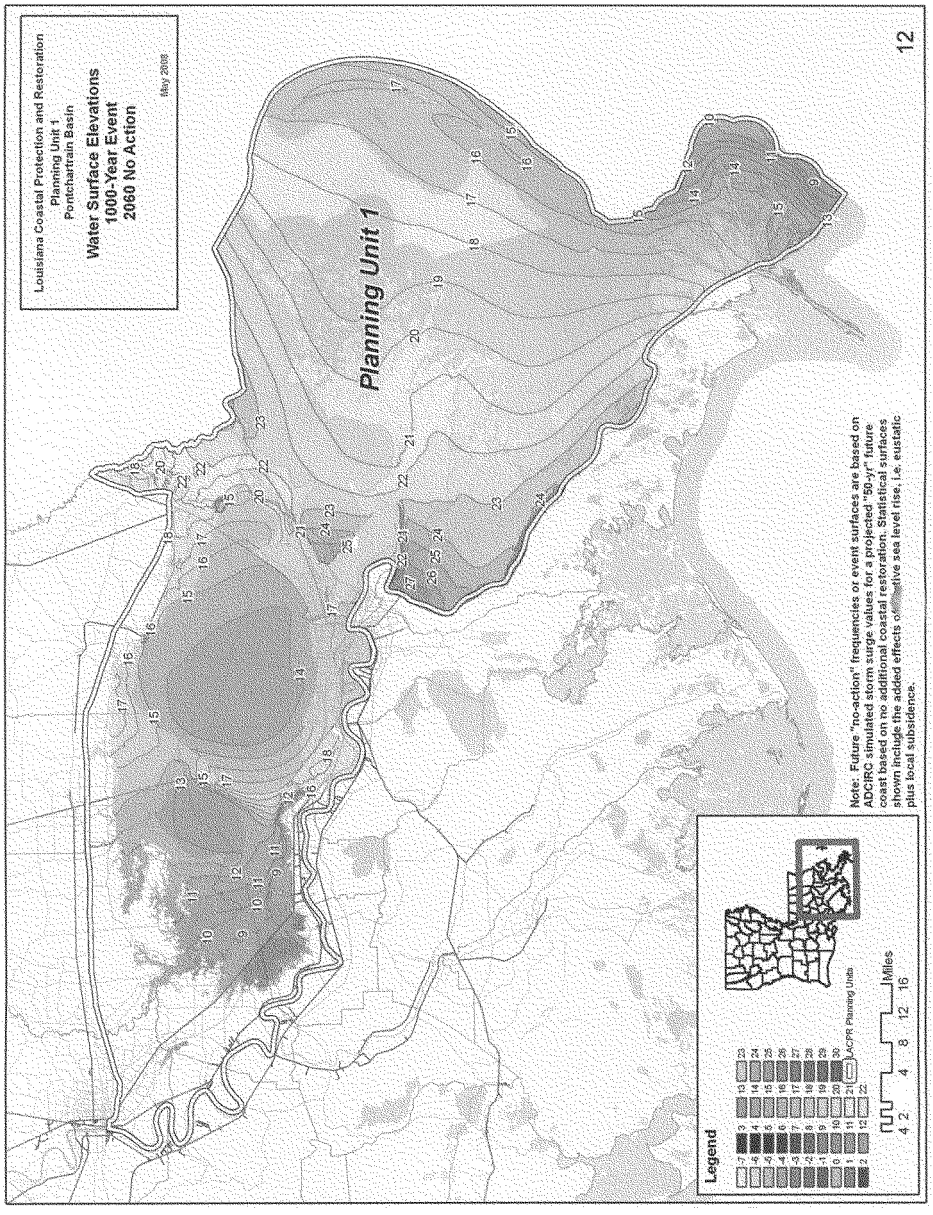
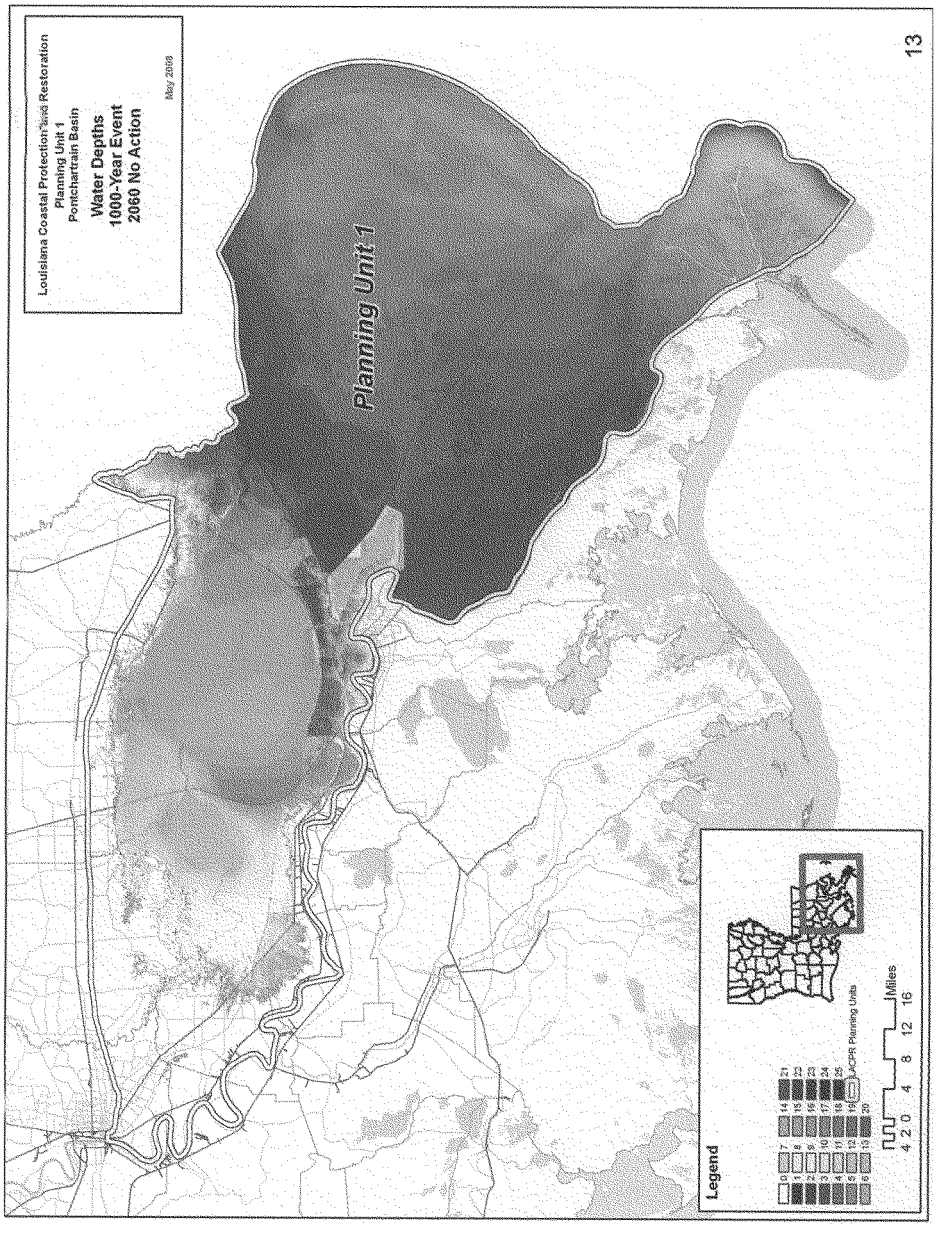
LACPR Planning Units
4 2 0 4 8 12 16
Miles
11


Louisiana Coastal Protection and Restoration
Planning Unit 1
Pontchartrain Basin
Water Surface Elevations
1000-Year Event
2060 No Action
May 2008
Planning Unit 1
Legend
LACPR Planning Units
Miles
4 2 4 8 12 16
Note: Future "no-action" frequencies or event surfaces are based on ADCIRC simulated storm surge values for a projected "50-yr" future coast based on no additional coastal restoration. Statistical surfaces shown include the added effects of relative sea level rise, i.e. eustatic plus local subsidence.
12


Louisiana Coastal Protection and Restoration
Planning Unit 1
Pontchartrain Basin
Water Depths
1000-Year Event
2060 No Action
May 2056
Planning Unit 1
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LACPR Planning Units
Miles
4 2 0 4 8 12 16
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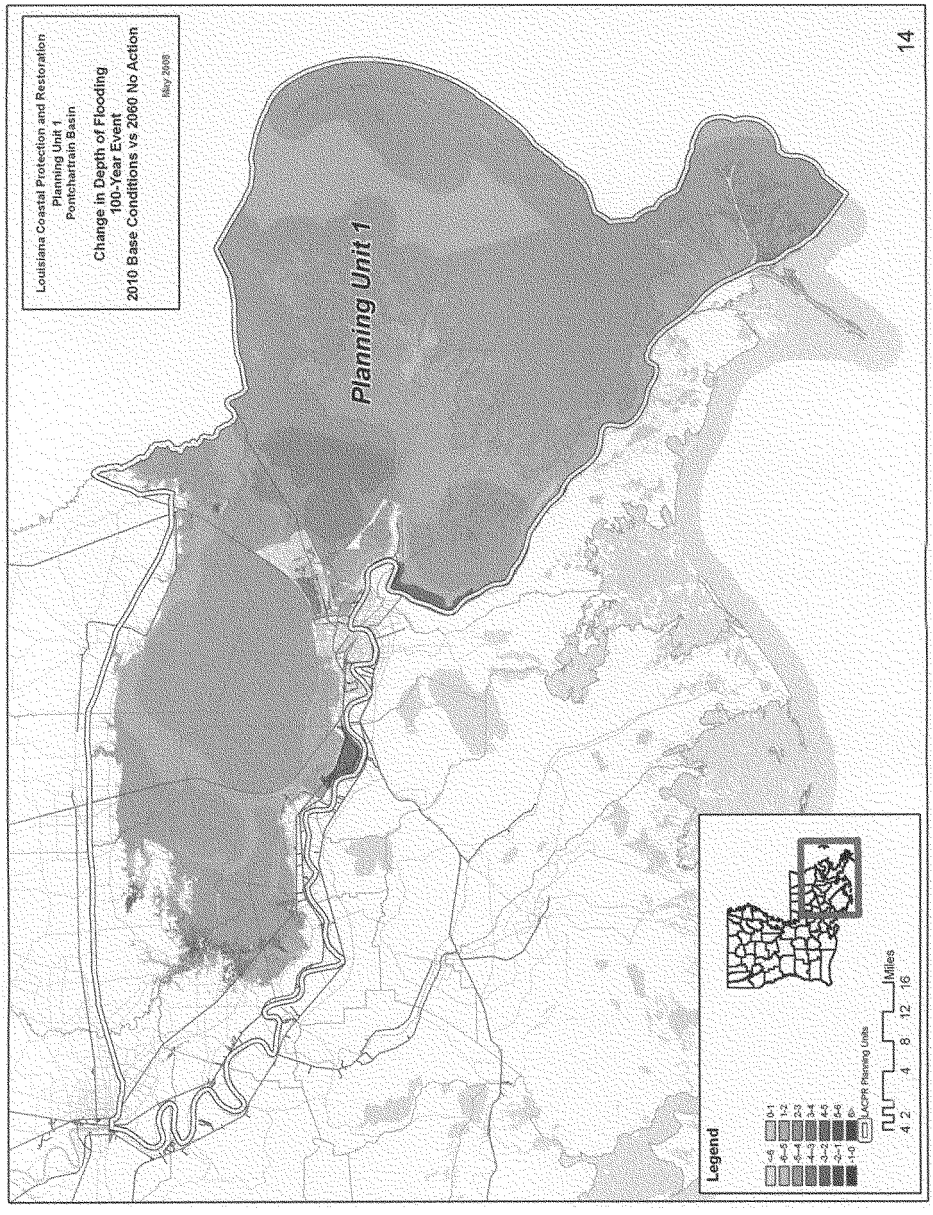
Louisiana Coastal Protection and Restoration
Planning Unit 1
Pontchartrain Basin
Change in Depth of Flooding
100-Year Event
2010 Base Conditions vs 2060 No Action
May 2008
Planning Unit 1
Legend
<-6
-6--5
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-4--3
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4-5
5-6
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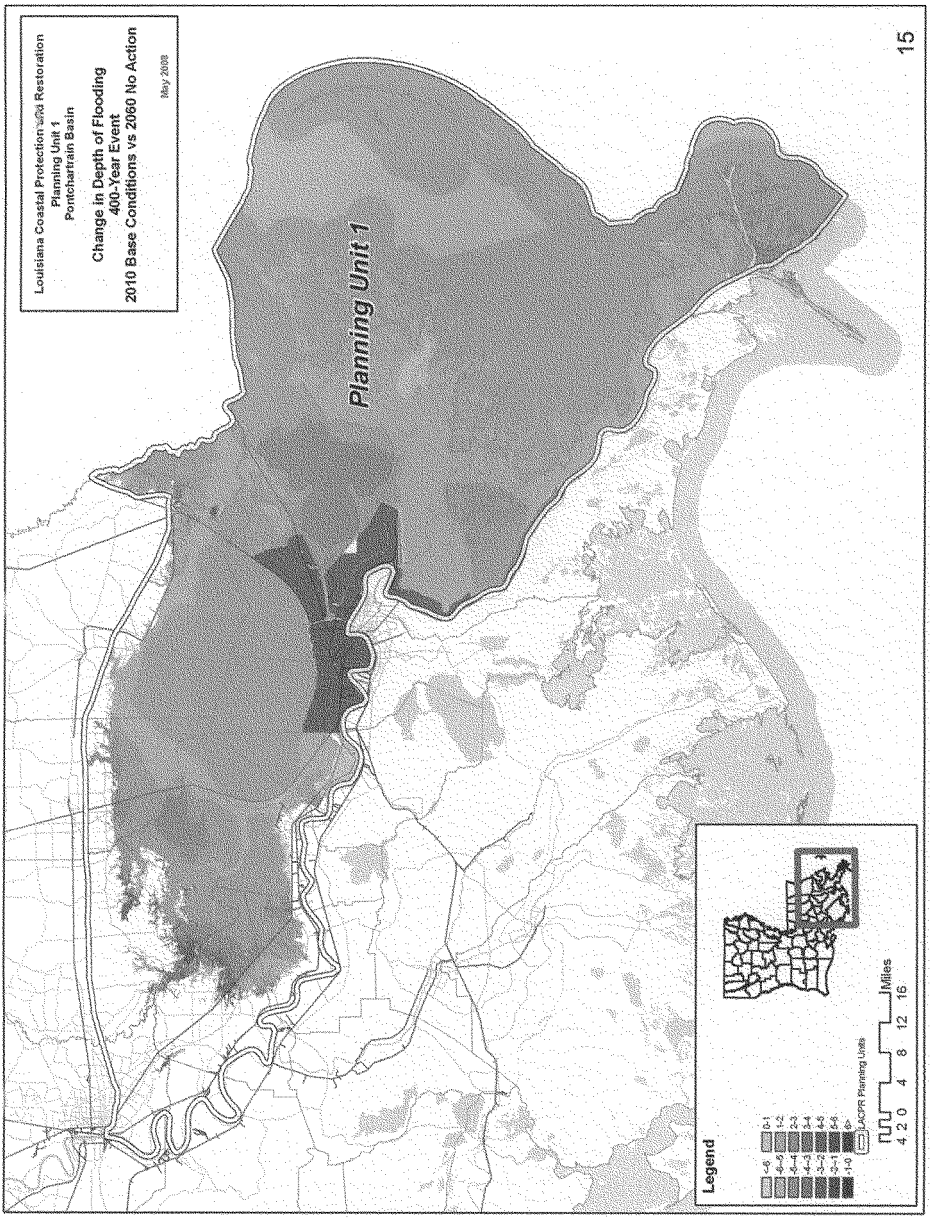
LACPR Planning Units
4 2 4 8 12 16 Miles
14


Louisiana Coastal Protection and Restoration
Planning Unit 1
Pontchartrain Basin
Change in Depth of Flooding
400-Year Event
2010 Base Conditions vs 2060 No Action
May 2008
Planning Unit 1
Legend
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LACPR Planning Units
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Miles
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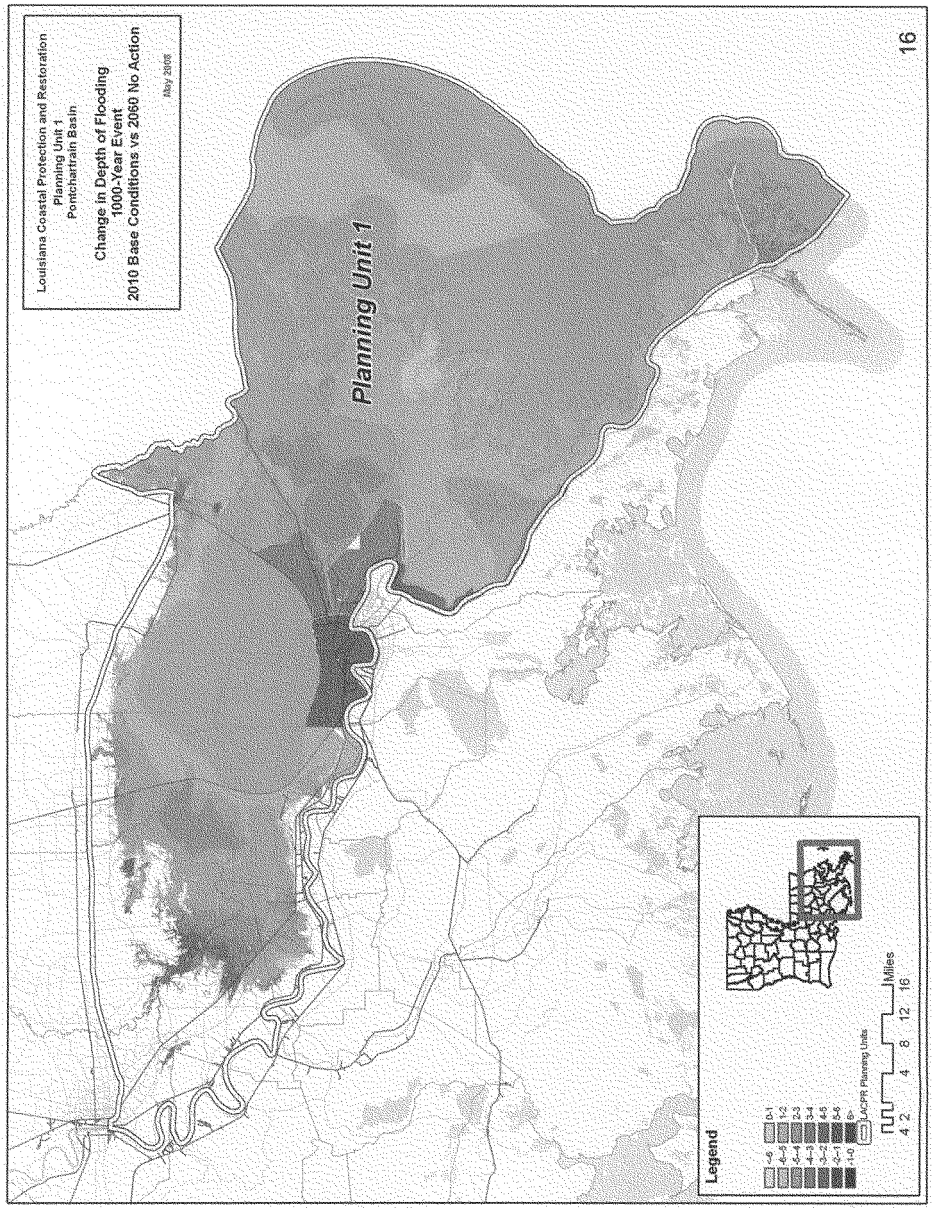
Louisiana Coastal Protection and Restoration
Planning Unit 1
Pontchartrain Basin
Change in Depth of Flooding
1000-Year Event
2010 Base Conditions vs 2060 No Action
May 2008
Planning Unit 1
Legend
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-2--1
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5-6
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LACPR Planning Units
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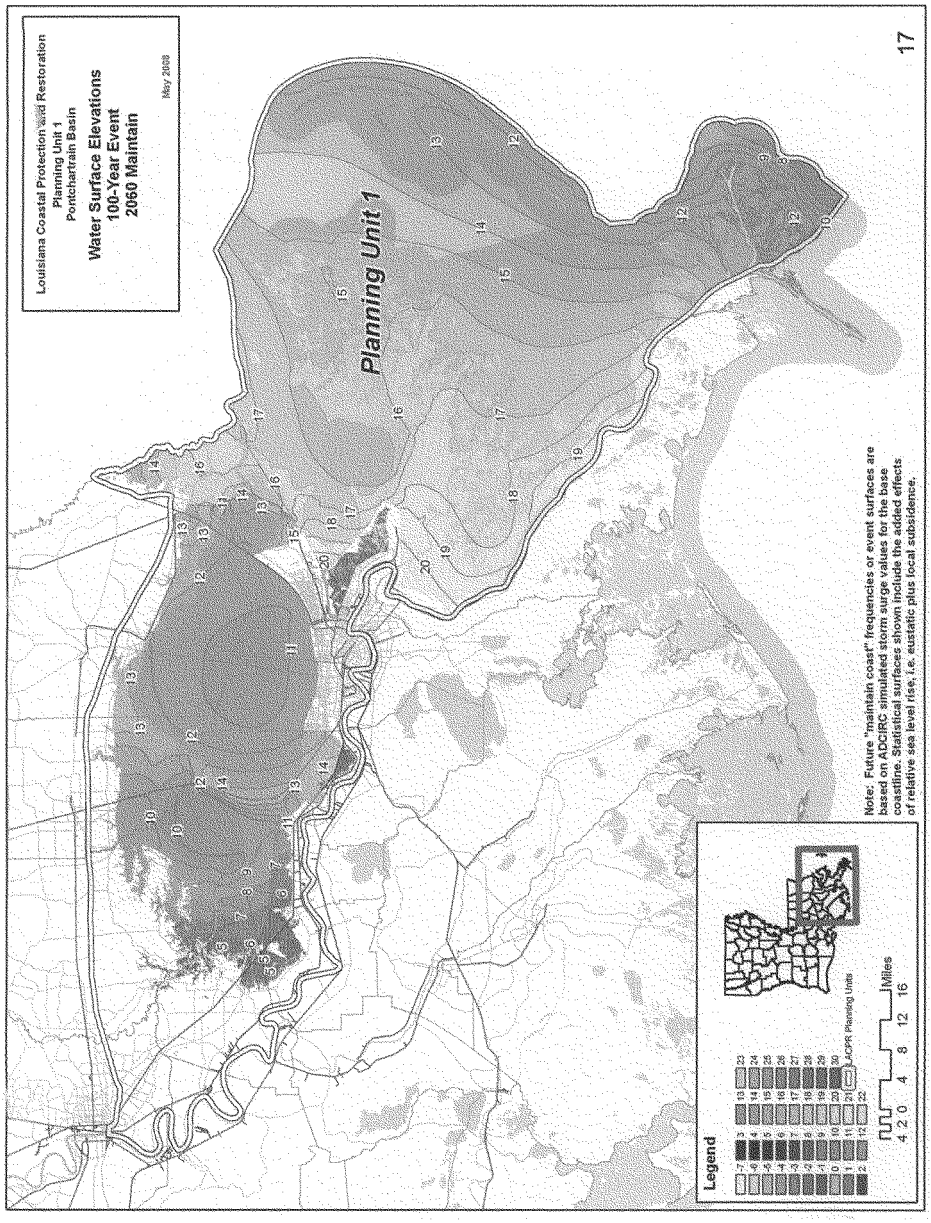
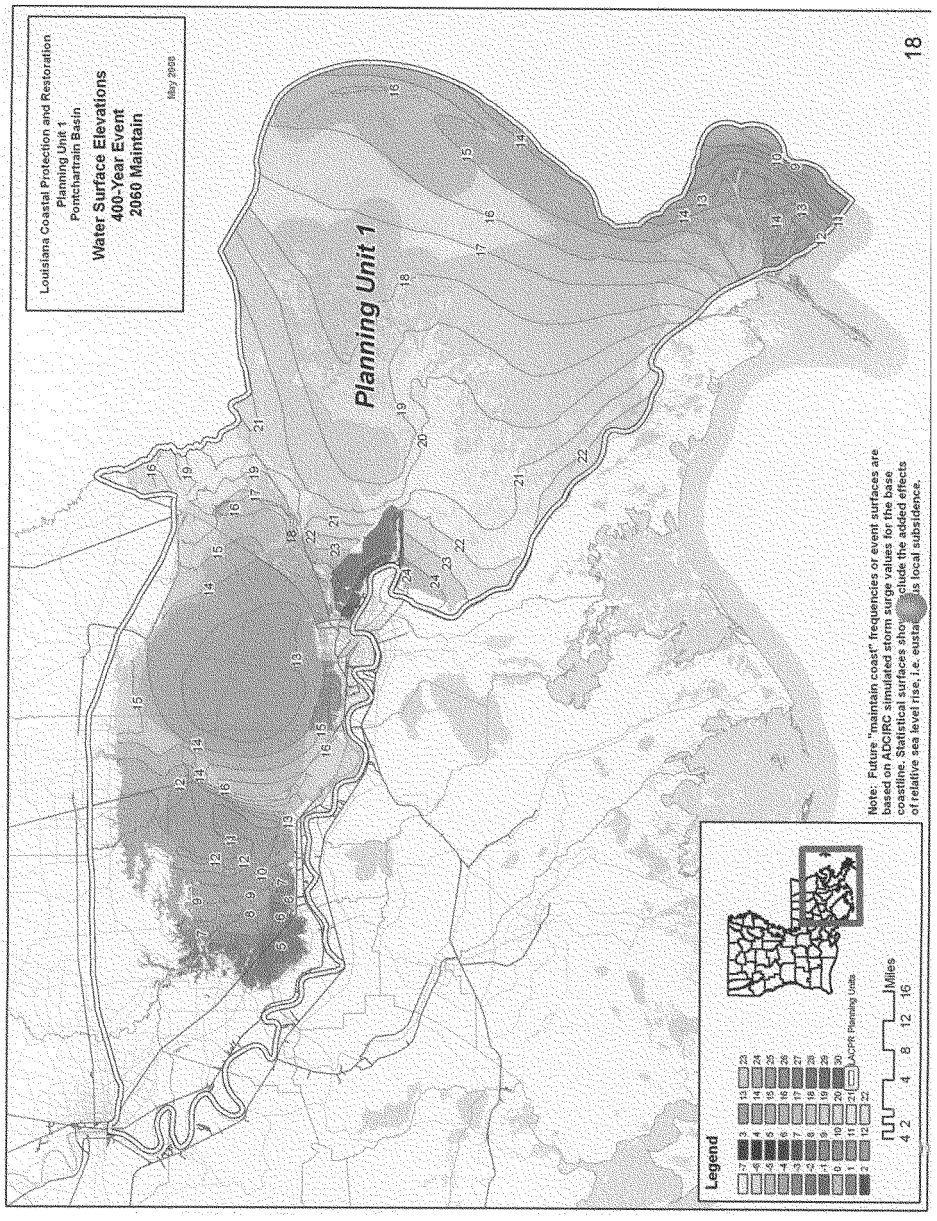
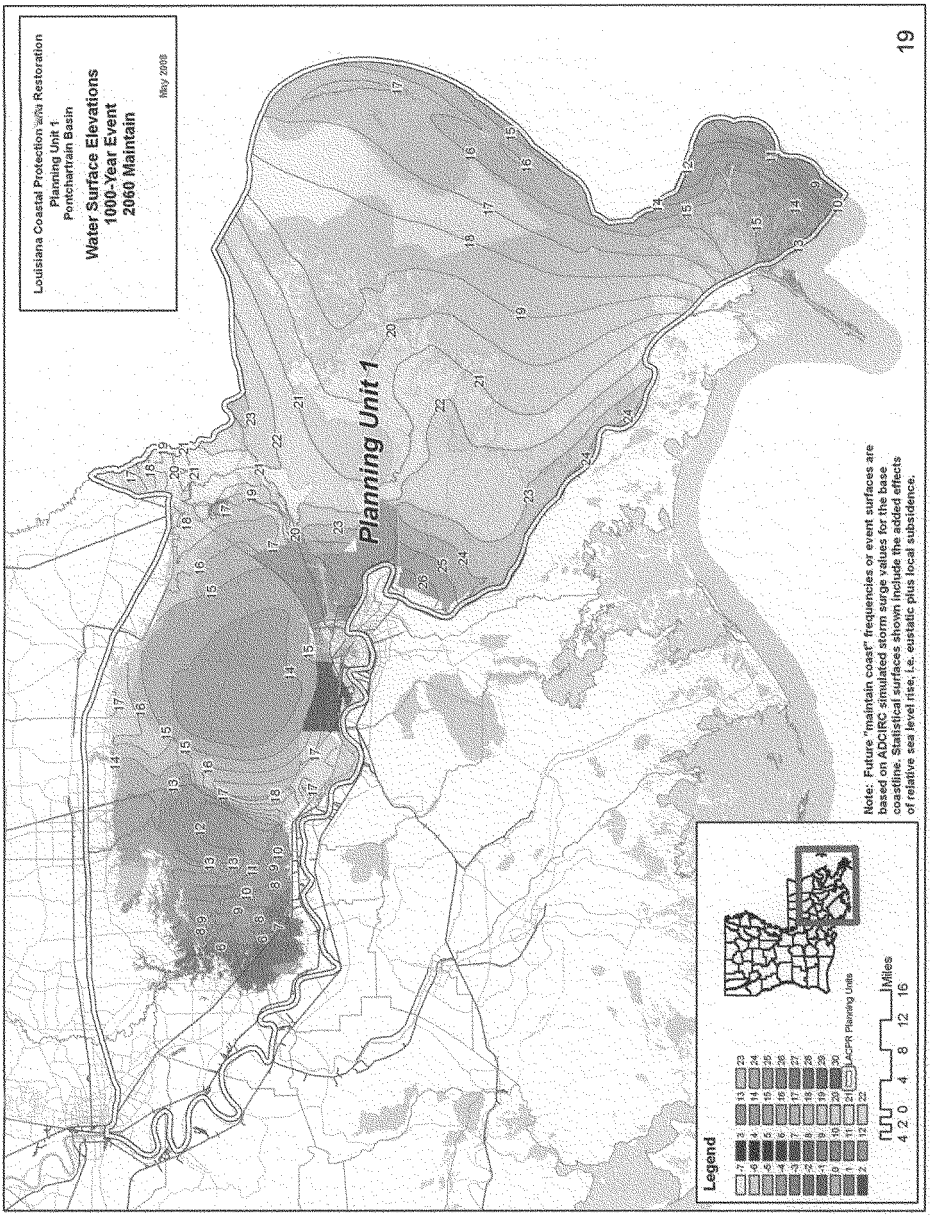
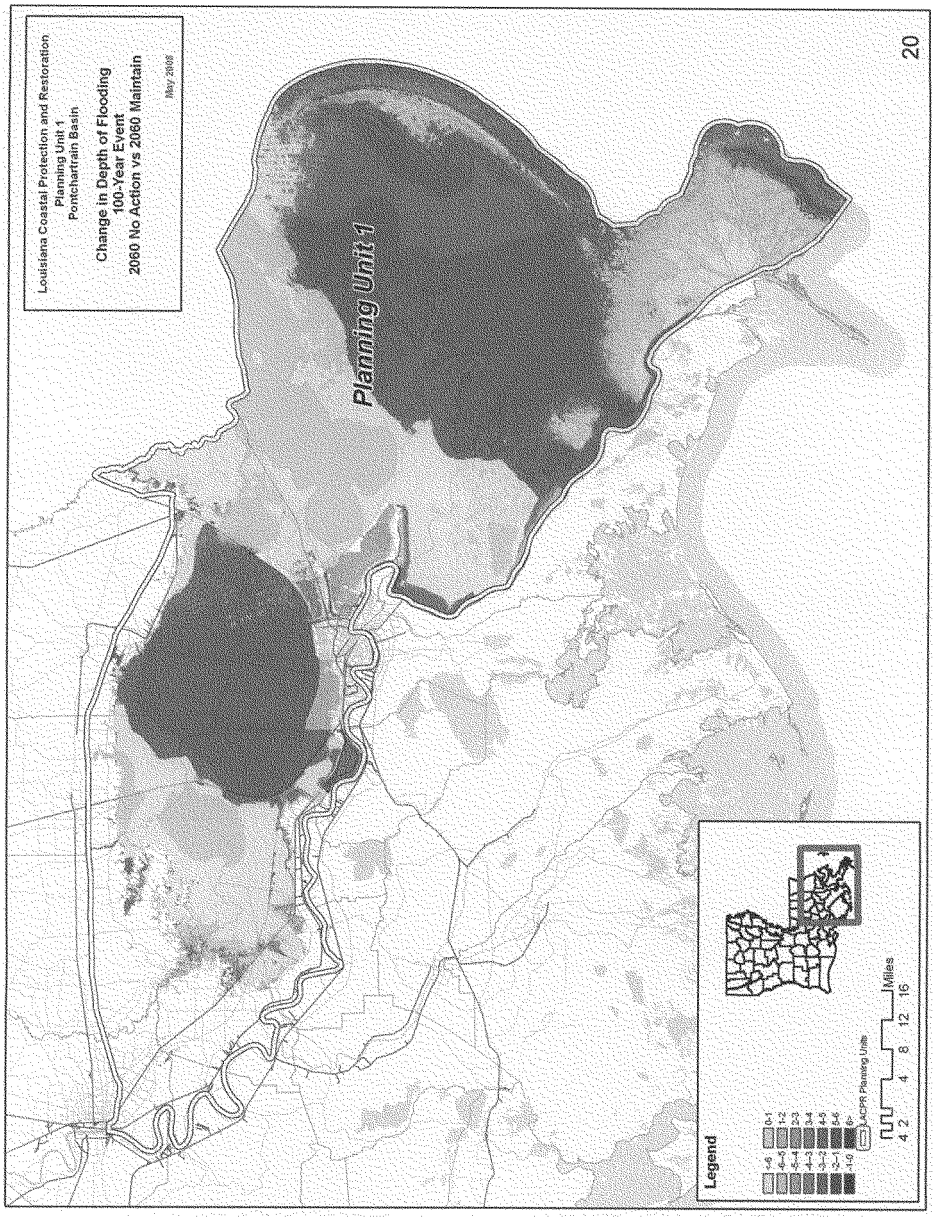
Miles
16


Louisiana Coastal Protection and Restoration
Planning Unit 1
Pontchartrain Basin
Water Surface Elevations
100-Year Event
2060 Maintain
May 2008
Planning Unit 1
Legend
LACPR Planning Units
Miles
4 2 0 4 8 12 16
Note: Future "maintain coast" frequencies or event surfaces are based on ADCIRC simulated storm surge values for the base coastline. Statistical surfaces shown include the added effects of relative sea level rise, i.e. eustatic plus local subsidence.
17


Louisiana Coastal Protection and Restoration
Planning Unit 1
Pontchartrain Basin
Water Surface Elevations
400-Year Event
2060 Maintain
May 2008
Planning Unit 1
Legend
Miles
0 2 4 8 12 16
Note: Future "maintain coast" frequencies or event surfaces are based on ADCIRC simulated storm surge values for the base coastline. Statistical surfaces show only the added effects of relative sea level rise, i.e. eustatic plus local subsidence.
18


Louisiana Coastal Protection and Restoration
Planning Unit 1
Pontchartrain Basin
Water Surface Elevations
1000-Year Event
2060 Maintain
May 2008
Planning Unit 1
Legend
LACPR Planning Units
Miles
4 2 0 4 8 12 16
Note: Future "maintain coast" frequencies or event surfaces are based on ADCIRC simulated storm surge values for the base coastline. Statistical surfaces shown include the added effects of relative sea level rise, i.e. eustatic plus local subsidence.
19


Louisiana Coastal Protection and Restoration
Planning Unit 1
Pontchartrain Basin
Change in Depth of Flooding
100-Year Event
2060 No Action vs 2060 Maintain
May 2008
Planning Unit 1
Legend
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-4--3
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-2--1
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6>
LACPR Planning Units
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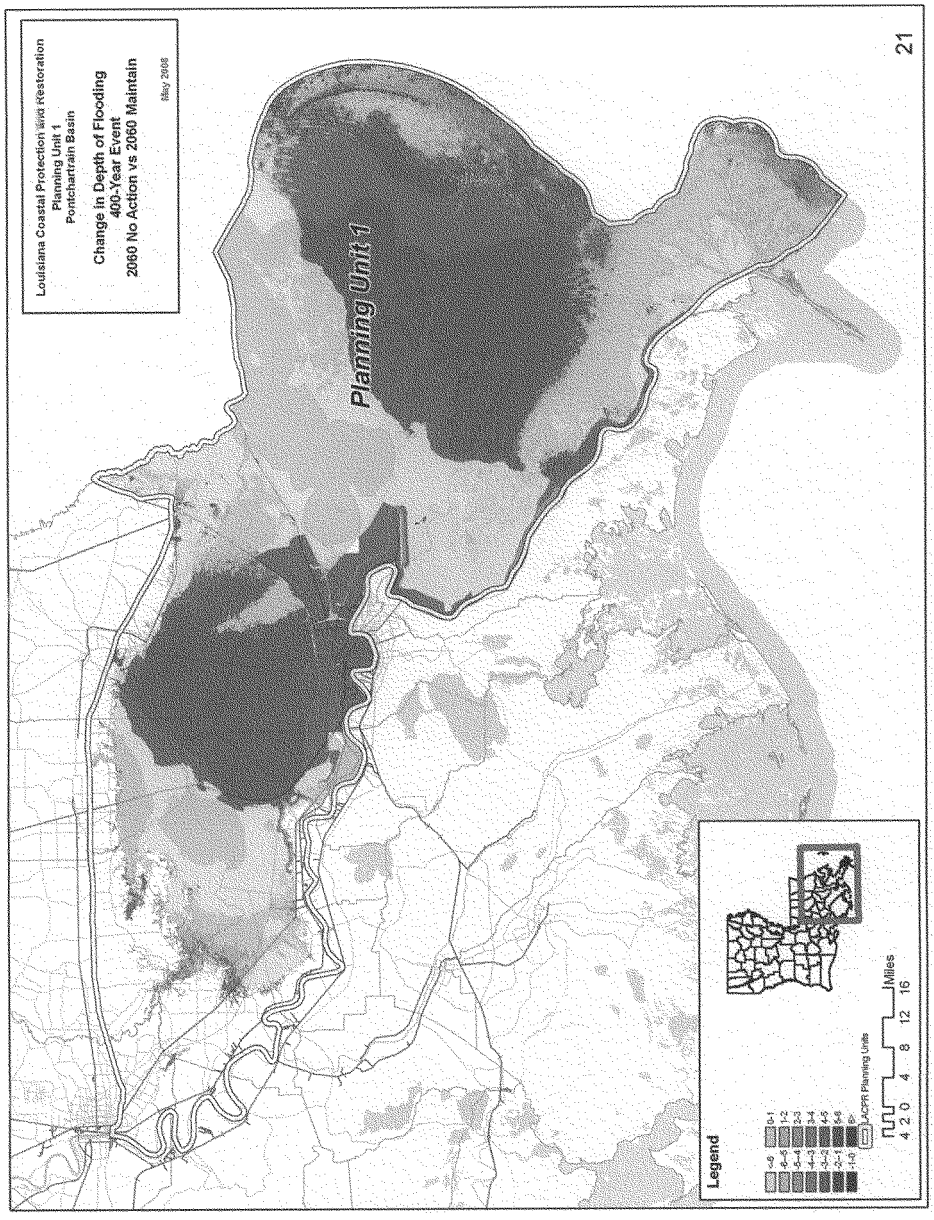
Miles
20


Louisiana Coastal Protection and Restoration
Planning Unit 1
Pontchartrain Basin
Change in Depth of Flooding
400-Year Event
2060 No Action vs 2060 Maintain
May 2008
Planning Unit 1
Legend
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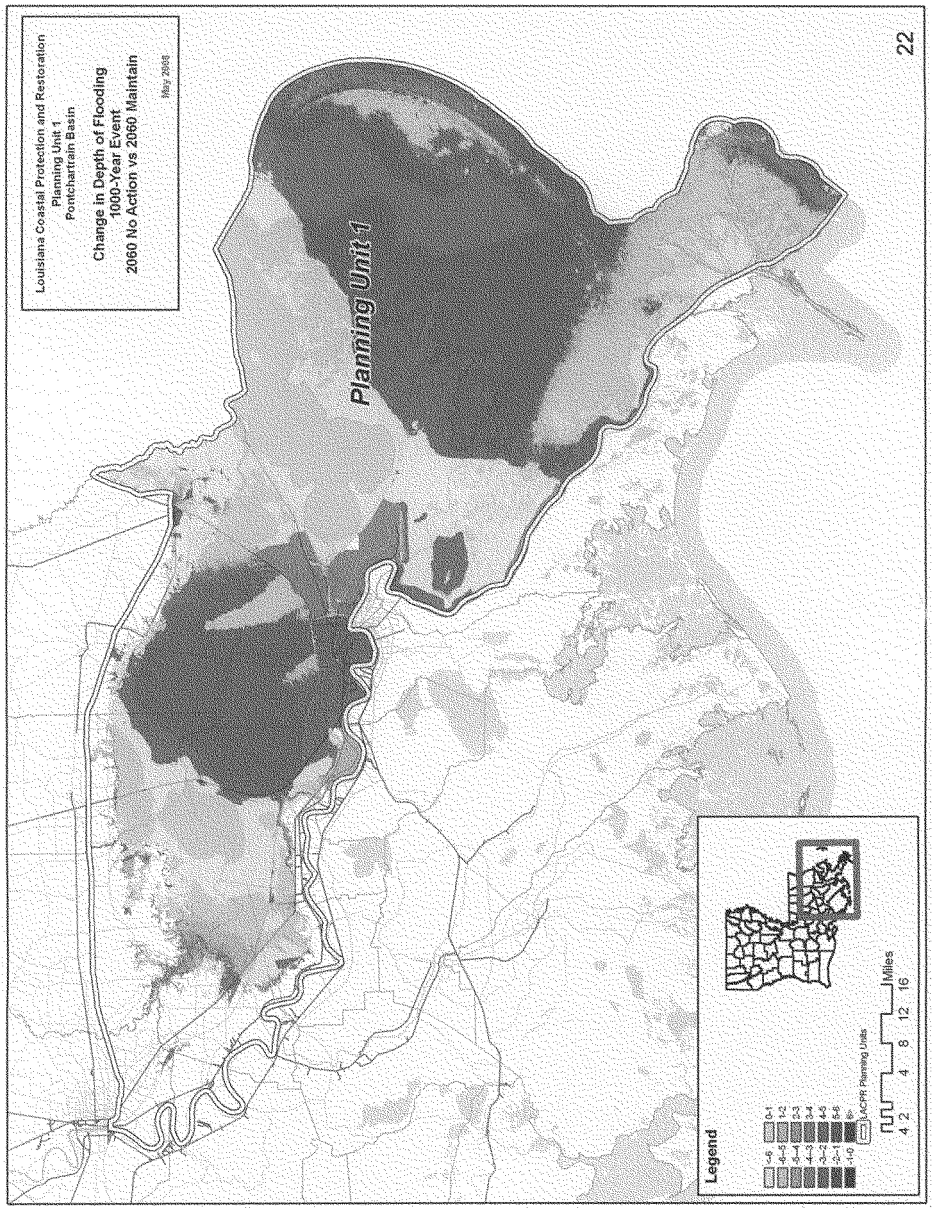
6+
5-6
6+
JACPR Planning Units
4 2 0 4 8 12 16
Miles
21


Louisiana Coastal Protection and Restoration
Planning Unit 1
Pontchartrain Basin
Change in Depth of Flooding
1000-Year Event
2060 No Action vs 2060 Maintain
May 2008
Planning Unit 1
Legend
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6+
LACPR Planning Units
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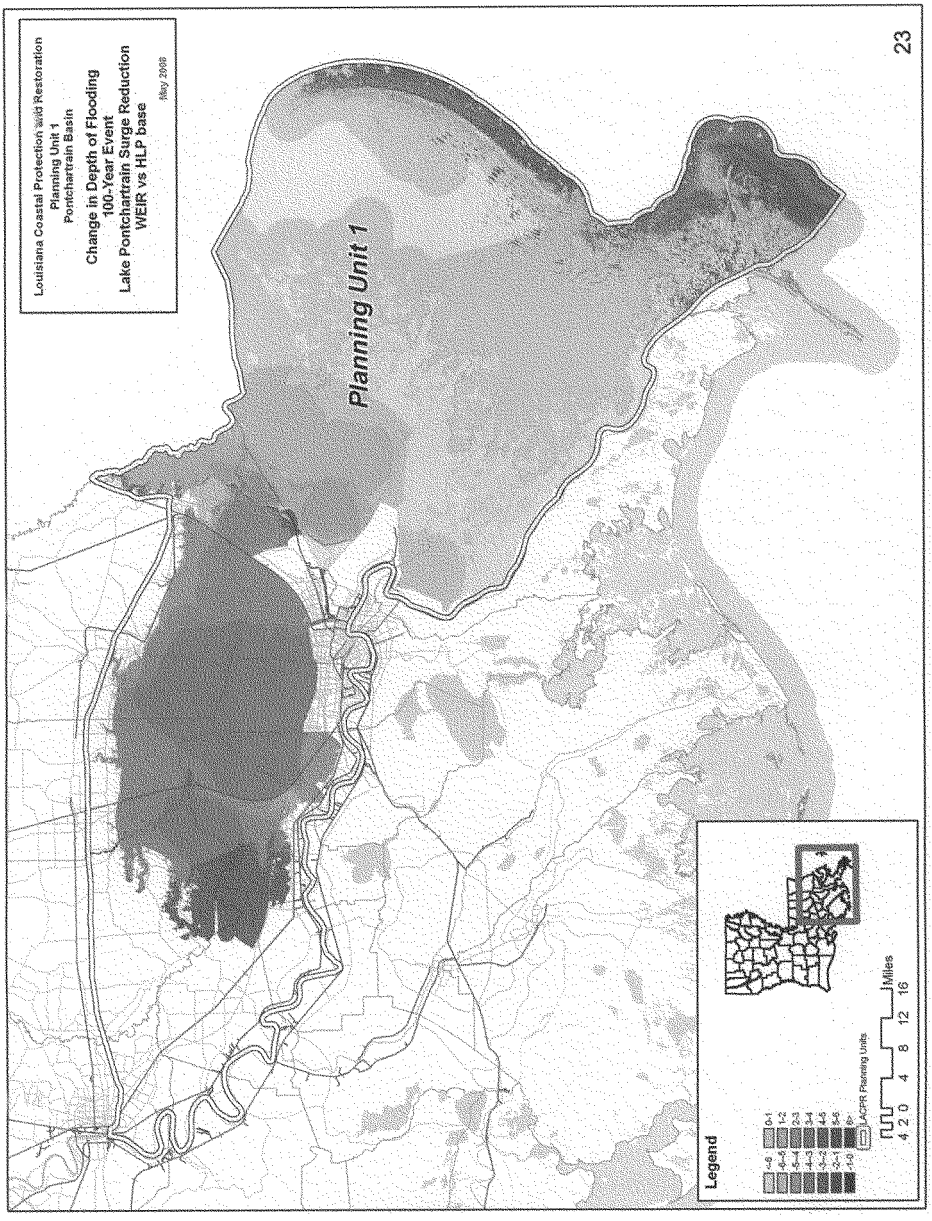
Miles
22


Louisiana Coastal Protection and Restoration
Planning Unit 1
Pontchartrain Basin
Change in Depth of Flooding
100-Year Event
Lake Pontchartrain Surge Reduction
WEIR vs HLP base
May 2008
Planning Unit 1
Legend
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-6
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LACPR Planning Units
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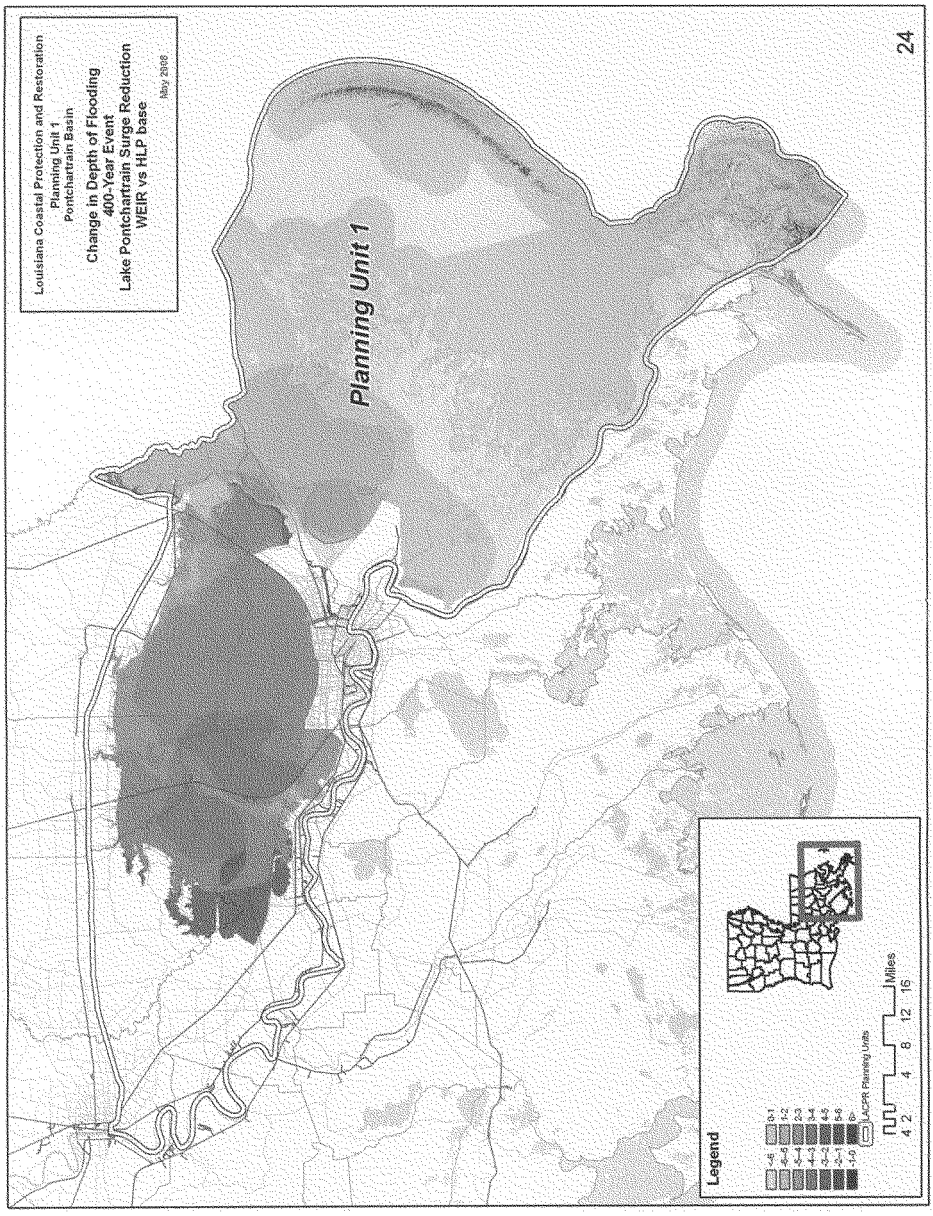
Miles
23


Louisiana Coastal Protection and Restoration
Planning Unit 1
Pontchartrain Basin
Change in Depth of Flooding
400-Year Event
Lake Pontchartrain Surge Reduction
WEIR vs HLP base
May 2008
Planning Unit 1
Legend
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LACPR Planning Units
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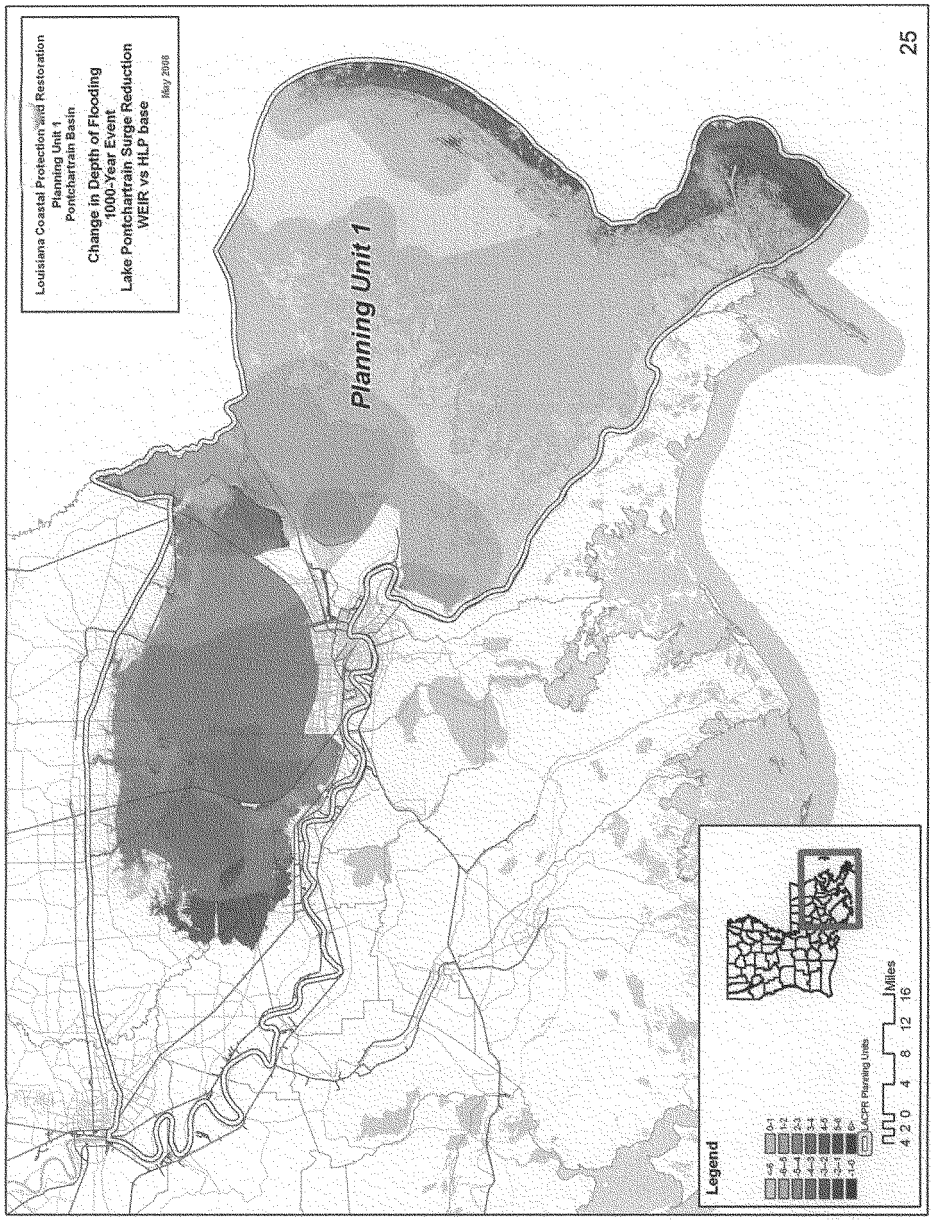
Miles
24


Louisiana Coastal Protection and Restoration
Planning Unit 1
Pontchartrain Basin
Change in Depth of Flooding
1000-Year Event
Lake Pontchartrain Surge Reduction
WEIR vs HLP base
May 2008
Planning Unit 1
Legend
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-4--3
-3--2
-2--1
-1-0
0-1
1-2
2-3
3-4
4-5
5-6
6+
LACPR Planning Units
4 2 0 4 8 12 16
Miles
25

Planning Unit:	1	Alt. No.:	PU1-0	Category:	No Action
Alternative Description:	No action (without project) alternative.				
Coastal Component:	Degraded coast--increasing risk.		Nonstructural Component:		None
Structural Component:	No new levees or increases in risk reduction level for existing levees.				

Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	0	37,371	442	287	1,471	76	143	130	50
		Mid		41,502	716	787	3,036	204	127	126	46
		Low		51,017	1,401	1,742	6,339	449	111	122	41
2	High RSLR High Employment Dispersed Population	High	0	38,803	522	524	2,092	134	143	130	50
		Mid		45,147	930	1,222	4,267	314	127	125	44
		Low		55,748	2,129	3,440	11,040	897	111	119	38
3	Low RSLR Business-as-Usual Compact Population	High	0	32,147	441	290	1,503	78	143	130	50
		Mid		35,876	684	656	2,785	174	127	126	46
		Low		43,832	1,267	1,262	5,246	341	111	122	41
4	High RSLR Business-as-Usual Compact Population	High	0	33,074	509	425	1,954	120	143	130	50
		Mid		38,592	852	879	3,526	239	127	125	44
		Low		47,254	1,800	2,710	8,909	700	111	119	38

Other Results	
Construction Time (years)	0
Direct Wetland Impacts (acres)	0
Indirect Impacts (unitless)	0
Spatial Integrity (unitless)	0.24

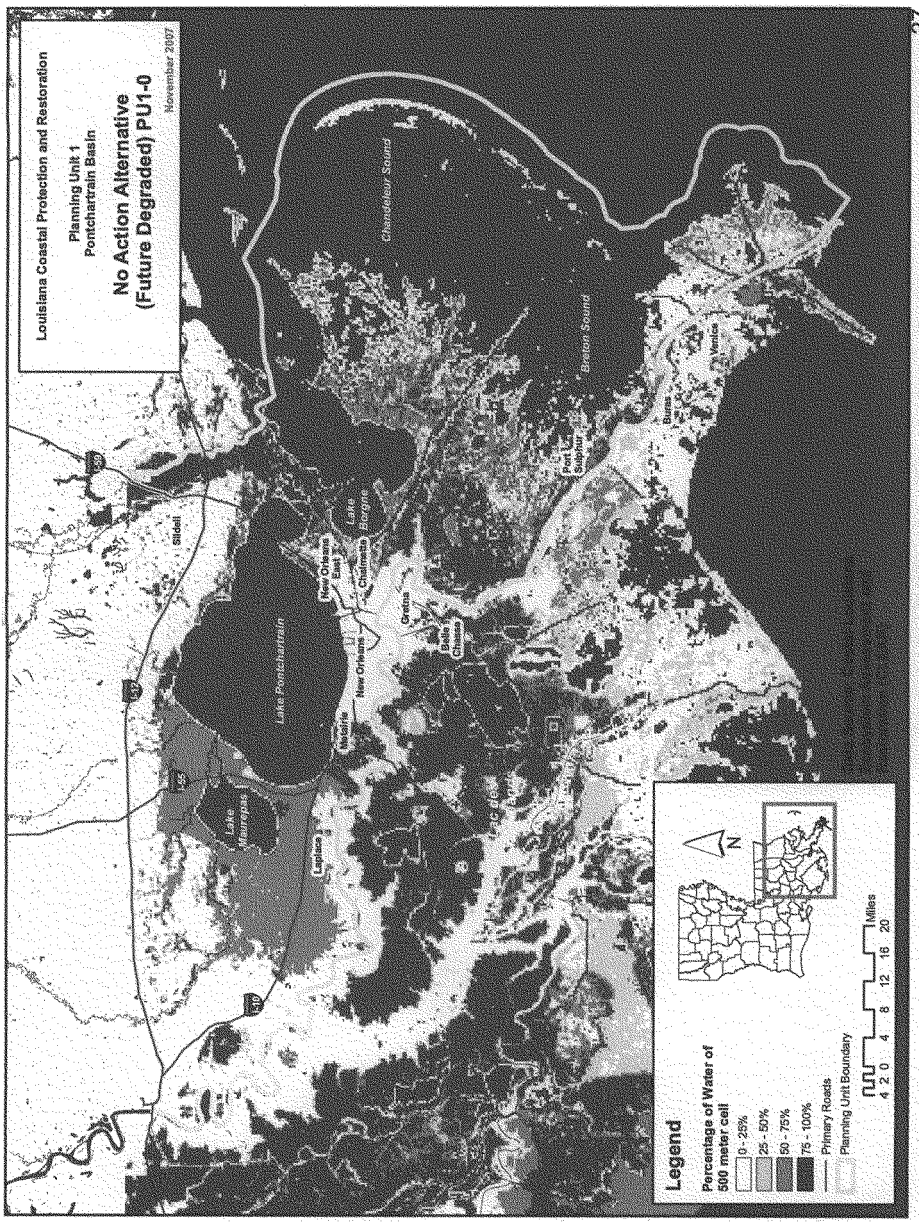
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)	
	1 / 2	0	0
	3 / 4	0	0

Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
After 50 yrs (% of baseline)	74	71	74	71
After 100 yrs (% of baseline)	49	37	49	37
Present Value of Life Cycle Costs ($ Millions)				
Coastal Component	0	0	0	0
Nonstructural Component	0	0	0	0
Structural Component	0	0	0	0
Total Project	0	0	0	0

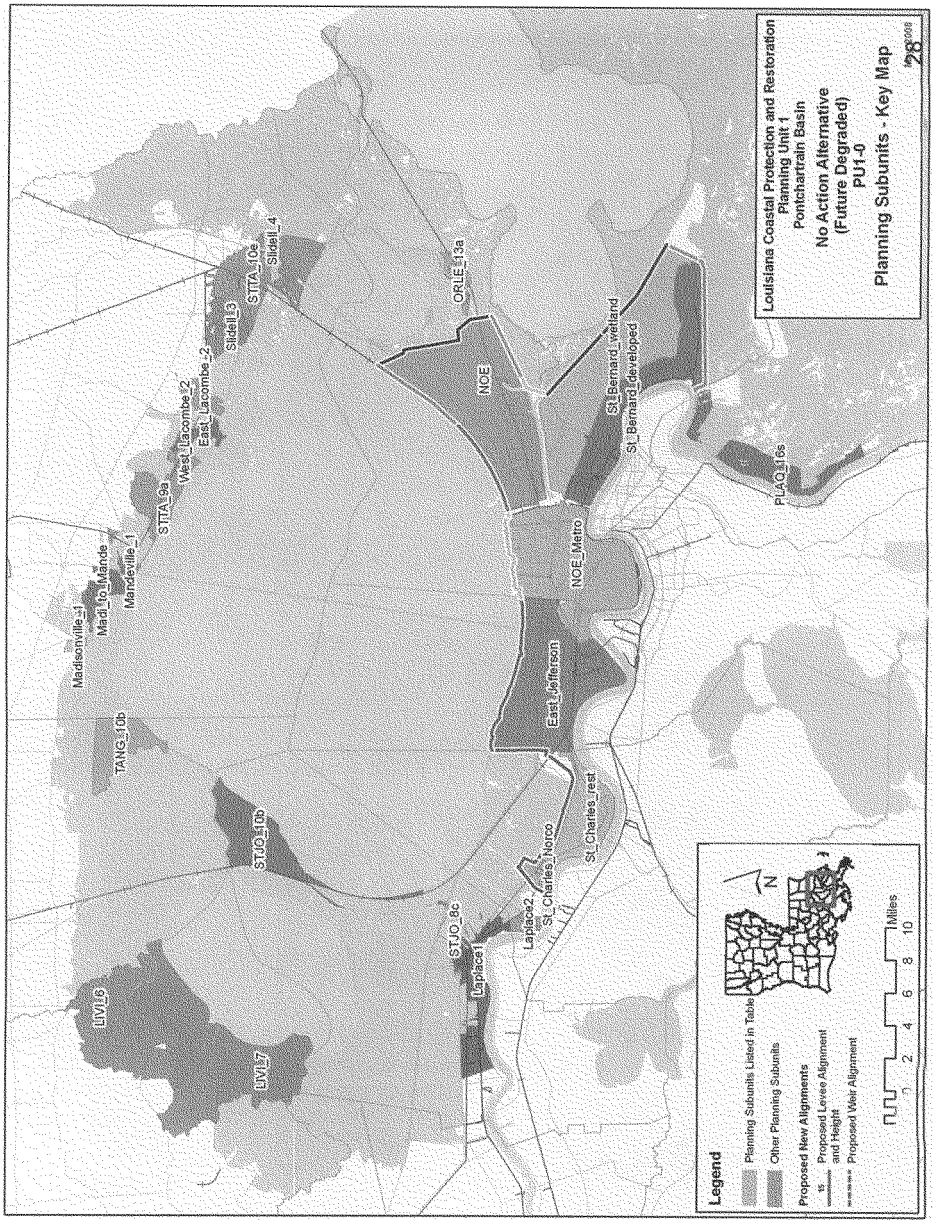
2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 1
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	
10-year	1,215	N/A	1,472	N/A	1,081	N/A	1,345	N/A	No Action Plan
100-year	11,935	N/A	34,000	N/A	9,879	N/A	26,076	N/A	
400-year	89,937	N/A	116,204	N/A	62,688	N/A	80,694	N/A	
1,000-year	118,260	N/A	122,423	N/A	81,963	N/A	84,515	N/A	
2,000-year	122,343	N/A	125,886	N/A	84,351	N/A	86,336	N/A	

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels.

1669


Louisiana Coastal Protection and Restoration
Planning Unit 1
Pontchartrain Basin
No Action Alternative
(Future Degraded) PU1-0
November 2007
Lake Pontchartrain
Lake Maurepas
Slidell
New Orleans East
Lake Catherine
New Orleans
Lake Borgne
Gretna
Belle Chasse
Chandeleur Sound
Breton Sound
Port Sulphur
Buras
Venice
Legend
Percentage of Water of 500 meter cell
0 - 25%
25 - 50%
50 - 75%
75 - 100%
Primary Roads
Planning Unit Boundary
Miles
4 2 0 4 8 12 16 20
N

27


Madisonville_1
Madi_to_Mande
Mandeville_1
TANG_10b
STTA_9a
West_Lacombe_2
East_Lacombe_2
Slidell_3
STTA_10a
Slidell_4
ORLE_13a
NOE
St_Bernard_wetland
St_Bernard_developed
PLAQ_16a
PLAQ_16b
NOE_Metro
East_Jefferson
St_Charles_West
St_Charles_Norco
Lapace2
Lapace1
STJO_8c
STJO_10b
LIVI_6
LIVI_7
Legend
Planning Subunits Listed in Table
Other Planning Subunits
Proposed New Alignments
15 Proposed Levee Alignment and Height
Proposed Weir Alignment
0 2 4 6 8 10 Miles
N
Louisiana Coastal Protection and Restoration
Planning Unit 1
Pontchartrain Basin
No Action Alternative
(Future Degraded)
PU1-0
Planning Subunits - Key Map
28

Alternative: PU1-0

Water Surface Elevations (feet - NAVD88 2004.65)

Planning Sub Unit	2010 (Base) Conditions						2060 (Future) Conditions					
	100-yr Event		400-year Event		1,000-yr Event		100-yr Event		400-year Event		1,000-yr Event	
	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project
East_Jefferson	-5.1		-1.3		4.4		-2.6		16.0		16.0	
East_Lacombe_2	10.9		14.3		15.9		17.3		21.7		23.6	
Laplace1	9.4		12.2		14.0		12.4		15.0		16.8	
Laplace2	8.5		11.0		12.8		11.2		14.3		16.2	
LIVI_6	7.3		9.7		11.1		10.3		12.8		13.9	
LIVI_7	7.5		9.7		10.9		11.0		13.1		14.4	
Madi_to_Mande	11.0		13.1		14.3		13.8		16.7		18.3	
Madisonville_1	11.7		14.6		16.1		13.5		15.8		16.9	
Mandeville_1	11.0		13.1		14.3		14.9		19.1		21.4	
NOE	-5.8		0.5		10.9		-0.1		16.0		16.0	
NOE_Metro	-5.1		-4.8		-3.0		-5.0		16.0		16.0	
ORLE_13a	14.6		17.8		19.4		17.9		21.5		23.8	
PLAQ_16s	19.2		25.3		30.0		21.4		27.8		31.8	
Slidell_3	11.5		15.1		16.8		13.4		16.8		18.5	
Slidell_4	14.1		18.3		20.4		20.5		24.3		26.5	
St_Bernard_developed	-0.1		4.3		10.6		2.3		16.0		16.0	
St_Bernard_wetland	2.4		5.2		10.6		4.5		16.0		16.0	
St_Charles_Norco	4.4		16.0		16.0		11.5		17.3		18.6	
St_Charles_rest	2.1		16.0		16.0		11.5		17.3		18.6	
STJO_10b	10.6		12.9		14.1		13.3		15.6		16.7	
STJO_8c	9.4		12.2		14.0		12.7		15.4		17.2	
STTA_10e	12.2		16.2		18.2		13.3		16.7		18.6	
STTA_9a	10.4		12.7		14.0		13.2		15.6		17.5	
TANG_10b	11.0		13.6		15.0		13.7		16.3		17.8	
West_Lacombe_2	10.5		13.5		15.0		13.2		15.8		17.3	

Evaluation Parameters				
	Confidence Level:	90%	Levee Design:	No Friction Waves
	Future Relative Sea Level Rise:	2.6 feet	Levee Overtopping:	No Friction Waves

Planning Unit:	1	Alt. No.:	PU1-R1	Category:	Coastal Restoration Only
Alternative Description:	Sustain coastal landscape through restoration including shoreline protection, marsh creation, and steady state diversions.				
Coastal Component:	R1 (steady state diversions)		Nonstructural Component:		None
Structural Component:	No new levees or increases in risk reduction level for existing levees.				

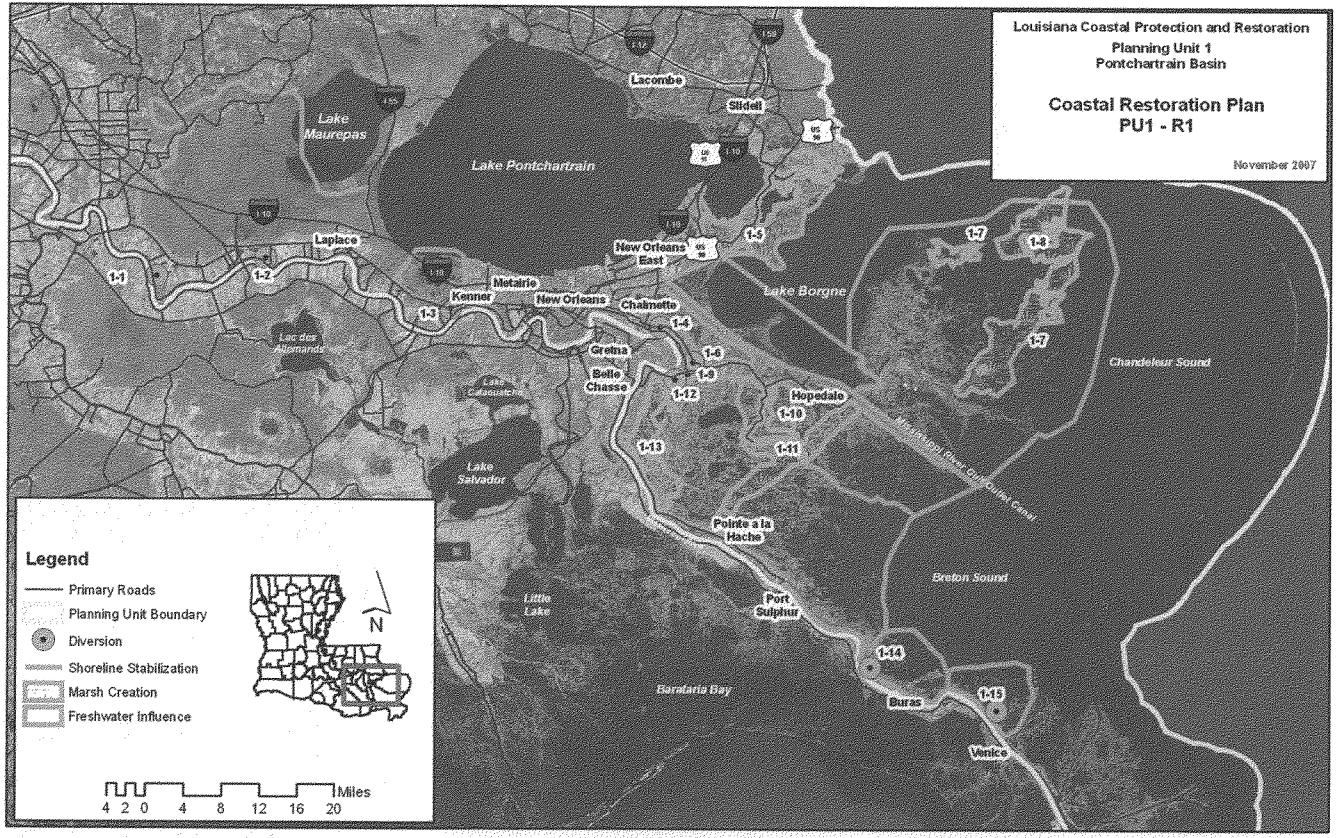
Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv $ Millions	Ann. Equiv. #	Ann. Equiv $ Millions	Ann. Equiv $ Millions	Ann. Equiv #	Ann. Equiv $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	484	37,016	423	278	1,443	74	313	134	51
		Mid		40,243	616	486	2,219	123	267	130	48
		Low		45,113	1,106	1,237	4,983	323	221	126	43
2	High RSLR High Employment Dispersed Population	High	496	38,180	483	428	1,847	111	313	134	51
		Mid		41,354	693	811	3,225	217	267	129	45
		Low		46,581	1,313	1,344	5,378	358	221	123	40
3	Low RSLR Business-as-Usual Compact Population	High	484	31,844	424	273	1,468	74	313	134	51
		Mid		34,923	614	441	2,189	116	267	130	48
		Low		39,623	1,075	981	4,536	275	221	126	43
4	High RSLR Business-as-Usual Compact Population	High	496	32,620	480	378	1,818	107	313	134	51
		Mid		35,729	677	648	2,955	189	267	129	45
		Low		40,585	1,210	1,072	4,876	305	221	123	40

Other Results		
Construction Time (years)		15
Direct Wetland Impacts (acres)		0
Indirect Impacts (unitless)		0
Spatial Integrity (unitless)		0.43
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)
	1 / 2	3,317
	3 / 4	3,317

Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
After 50 yrs (% of baseline)	107	104	107	104
After 100 yrs (% of baseline)	105	96	105	96
Present Value of Life Cycle Costs ($ Millions)				
Coastal Component	9,476	9,710	9,476	9,710
Nonstructural Component	0	0	0	0
Structural Component	0	0	0	0
Total Project	9,476	9,710	9,476	9,710

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 1 Coastal Plan Coastal Restoration Alt
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	
10-year	1,215	1,214	1,472	1,466	1,081	1,081	1,345	1,339	
100-year	11,935	5,957	34,000	12,291	9,879	5,946	26,076	9,992	
400-year	89,937	54,550	116,204	58,923	62,688	40,242	80,694	42,875	
1,000-year	118,260	78,763	122,423	82,448	81,963	56,290	84,515	58,415	
2,000-year	122,343	119,248	125,886	123,202	84,351	82,754	86,336	84,994	

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels.


Louisiana Coastal Protection and Restoration
Planning Unit 1
Pontchartrain Basin
Coastal Restoration Plan
PU1 - R1
November 2007
Lake Maurepas
Lake Pontchartrain
Lacombe
Slidell
Laplace
New Orleans East
Metairie
Kenner
New Orleans
Chalmette
Lake Borgne
Lac des Allemands
Gretna
Belle Chasse
Hopedale
Chandeleur Sound
Lake Salvador
Pointe a la Hache
Breton Sound
Port Sulphur
Little Lake
Barataria Bay
Buras
Venice
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1-7
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Legend
Primary Roads
Planning Unit Boundary
Diversion
Shoreline Stabilization
Marsh Creation
Freshwater Influence
N
Miles
4 2 0 4 8 12 16 20

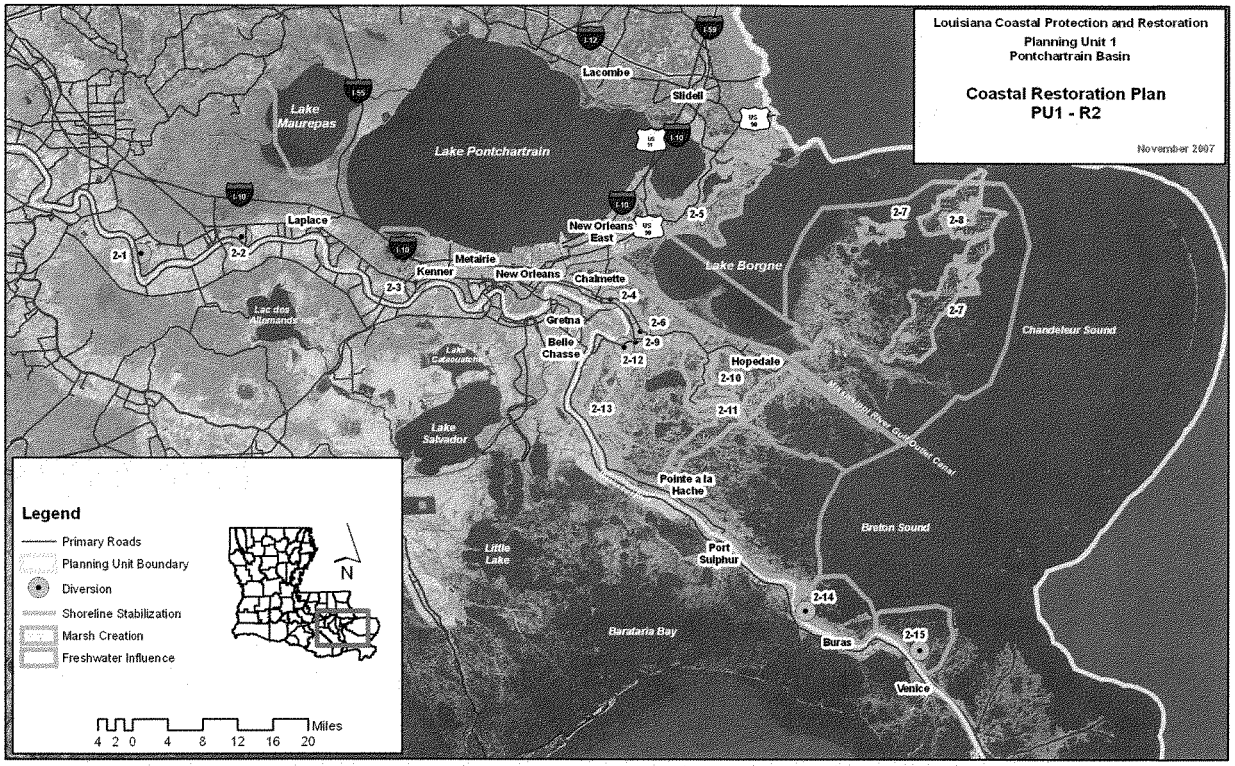
Planning Unit:	1	Alt. No.:	PU1-R2	Category:	Coastal Restoration Only
Alternative Description:	Sustain coastal landscape through restoration including shoreline protection, marsh creation, and pulsed diversions.				
Coastal Component:	R2 (pulsed diversions)		Nonstructural Component:		None
Structural Component:	No new levees or increases in risk reduction level for existing levees.				

Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	543	37,016	423	278	1,443	74	313	134	51
		Mid		40,243	616	486	2,219	123	267	130	48
		Low		45,113	1,106	1,237	4,983	323	221	126	43
2	High RSLR High Employment Dispersed Population	High	557	38,180	483	428	1,847	111	313	134	51
		Mid		41,354	693	811	3,225	217	267	129	45
		Low		46,581	1,313	1,344	5,378	358	221	123	40
3	Low RSLR Business-as-Usual Compact Population	High	543	31,844	424	273	1,468	74	313	134	51
		Mid		34,923	614	441	2,189	116	267	130	48
		Low		39,623	1,075	981	4,536	275	221	126	43
4	High RSLR Business-as-Usual Compact Population	High	557	32,620	480	378	1,818	107	313	134	51
		Mid		35,729	677	648	2,955	189	267	129	45
		Low		40,585	1,210	1,072	4,876	305	221	123	40

Other Results			Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Construction Time (years)		15	After 50 yrs (% of baseline)	106	104	106	104
Direct Wetland Impacts (acres)		0	After 100 yrs (% of baseline)	104	95	104	95
Indirect Impacts (unitless)		0	Present Value of Life Cycle Costs ($ Millions)				
Spatial Integrity (unitless)		0.42	Coastal Component	10,666	10,899	10,666	10,899
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)	Nonstructural Component	0	0	0	0
	1 / 2	3,733	Structural Component	0	0	0	0
	3 / 4	3,733	Total Project	10,666	10,899	10,666	10,899

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 1 Coastal Plan Coastal Restoration Alt
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	
10-year	1,215	1,214	1,472	1,466	1,081	1,081	1,345	1,339	
100-year	11,935	5,957	34,000	12,291	9,879	5,946	26,076	9,992	
400-year	89,937	54,550	116,204	58,923	62,688	40,242	80,694	42,875	
1,000-year	118,260	78,763	122,423	82,448	81,963	56,290	84,515	58,415	
2,000-year	122,343	119,248	125,886	123,202	84,351	82,754	86,336	84,994	

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels.


Louisiana Coastal Protection and Restoration
Planning Unit 1
Pontchartrain Basin
Coastal Restoration Plan
PU1 - R2
November 2007
Lake Maurepas
Lake Pontchartrain
Lacombe
Slidell
Laplace
New Orleans East
Metairie
Kenner
New Orleans
Chalmette
Lake Borgne
Gretna
Bello Chasse
Hopedale
Chandeleur Sound
Lac des Allemands
Lake Cataouatche
Lake Salvador
Pointe a la Hache
Breton Sound
Little Lake
Port Sulphur
Barataria Bay
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Legend
Primary Roads
Planning Unit Boundary
Diversion
Shoreline Stabilization
Marsh Creation
Freshwater Influence
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Miles
4 2 0 4 8 12 16 20

1676

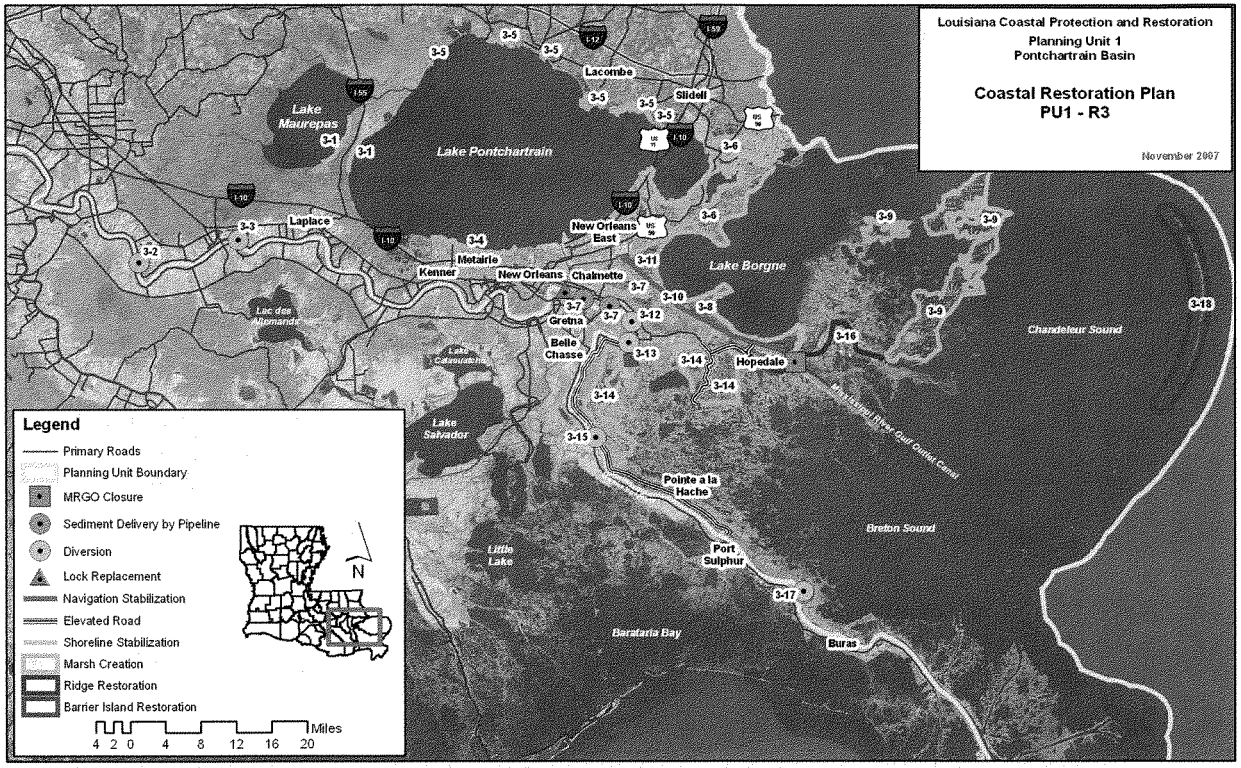
Planning Unit:	1	Alt. No.:	PU1-R3	Category:	Coastal Restoration Only
Alternative Description:	Sustain coastal landscape through restoration including shoreline protection, marsh creation, and diversions as proposed in the State Master Plan.				
Coastal Component:	R3 (state plan)		Nonstructural Component:		None
Structural Component:	No new levees or increases in risk reduction level for existing levees.				

Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv $ Millions	Ann. Equiv. #	Ann. Equiv $ Millions	Ann. Equiv $ Millions	Ann. Equiv #	Ann. Equiv $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	777	37,016	423	278	1,443	74	313	134	51
		Mid		40,243	616	486	2,219	123	267	130	48
		Low		45,113	1,106	1,237	4,983	323	221	126	43
2	High RSLR High Employment Dispersed Population	High	798	38,180	483	428	1,847	111	313	134	51
		Mid		41,354	693	811	3,225	217	267	129	45
		Low		46,581	1,313	1,344	5,378	358	221	123	40
3	Low RSLR Business-as-Usual Compact Population	High	777	31,844	424	273	1,468	74	313	134	51
		Mid		34,923	614	441	2,189	116	267	130	48
		Low		39,623	1,075	981	4,536	275	221	126	43
4	High RSLR Business-as-Usual Compact Population	High	798	32,620	480	378	1,818	107	313	134	51
		Mid		35,729	677	648	2,955	189	267	129	45
		Low		40,585	1,210	1,072	4,876	305	221	123	40

Other Results			Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Construction Time (years)		15	After 50 yrs (% of baseline)	109	107	109	107
Direct Wetland Impacts (acres)		0	After 100 yrs (% of baseline)	101	94	101	94
Indirect Impacts (unitless)		0	Present Value of Life Cycle Costs ($ Millions)				
Spatial Integrity (unitless)		0.44	Coastal Component	15,208	15,618	15,208	15,618
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)	Nonstructural Component	0	0	0	0
	1 / 2	5,323	Structural Component	0	0	0	0
	3 / 4	5,323	Total Project	15,208	15,618	15,208	15,618

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)								Planning Unit 1
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4	
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	Coastal Plan
10-year	1,215	1,214	1,472	1,466	1,081	1,081	1,345	1,339	
100-year	11,935	5,957	34,000	12,291	9,879	5,946	26,076	9,992	
400-year	89,937	54,550	116,204	58,923	62,688	40,242	80,694	42,875	Coastal
1,000-year	118,260	78,763	122,423	82,448	81,963	56,290	84,515	58,415	Restoration Alt
2,000-year	122,343	119,248	125,886	123,202	84,351	82,754	86,336	84,994	

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels.


Louisiana Coastal Protection and Restoration
Planning Unit 1
Pontchartrain Basin
Coastal Restoration Plan
PU1 - R3
November 2007
Legend
Primary Roads
Planning Unit Boundary
MRGO Closure
Sediment Delivery by Pipeline
Diversion
Lock Replacement
Navigation Stabilization
Elevated Road
Shoreline Stabilization
Marsh Creation
Ridge Restoration
Barrier Island Restoration
Miles
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Lake Maurepas
Lake Pontchartrain
Lake Borgne
Lake Salvador
Lake Cataouatche
Lac des Allemands
Little Lake
Barataria Bay
Breton Sound
Chandeleur Sound
Mississippi River Gulf Outlet Canal
Lacombe
Slidell
Laplace
Metairie
Kenner
New Orleans
New Orleans East
Chalmette
Gretna
Belle Chasse
Hopedale
Pointe a la Hache
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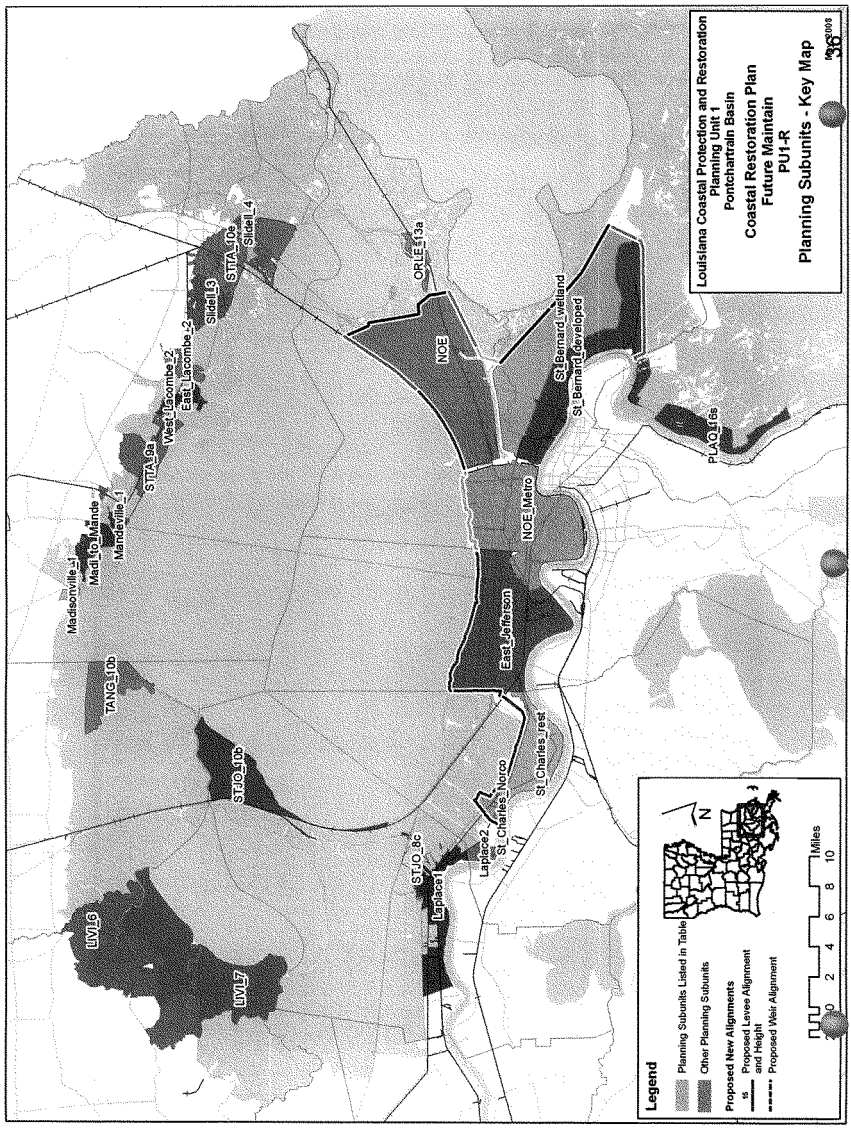
Louisiana Coastal Protection and Restoration
Planning Unit 1
Pontchartrain Basin
Coastal Restoration Plan
Future Maintain
PU1-R
Planning Subunits - Key Map
Legend
Planning Subunits Listed in Table
Other Planning Subunits
Proposed New Alignments
Proposed Levee Alignment and Height
Proposed Weir Alignment
Miles
N
Madisonville_s1
Mad_to_Mande
Mandeville_1
TANG_10b
STTA_9a
West_Lacombe_2
East_Lacombe_2
Slidell_9
STTA_10a
Slidell_4
ORLE_13a
NOE
St Bernard_wetland
St Bernard_developed
PLAQ_16s
NOE_Metro
East_Jefferson
St_Charles_rest
St_Charles_Norco
Laplace_2
Laplace_1
STJO_9c
STJO_10b
UVL6
UVL7

Alternative: PU1-R1, R2, and R3

Water Surface Elevations (feet - NAVD88 2004.65)

Planning Sub Unit	2010 (Base) Conditions*						2060 (Future) Conditions					
	100-yr Event		400-year Event		1,000-yr Event		100-yr Event		400-year Event		1,000-yr Event	
	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project
East_Jefferson	-5.1	-5.1	-1.3	-1.3	4.4	4.4	-2.6	-5.1	16.0	-1.3	16.0	4.4
East_Lacombe_2	10.9	10.9	14.3	14.3	15.9	15.9	17.3	13.5	21.7	16.9	23.6	18.5
Laplace1	9.4	9.4	12.2	12.2	14.0	14.0	12.4	12.0	15.0	14.8	16.8	16.6
Laplace2	8.5	8.5	11.0	11.0	12.8	12.8	11.2	11.1	14.3	13.6	16.2	15.4
LIVI_6	7.3	7.3	9.7	9.7	11.1	11.1	10.3	9.9	12.8	12.3	13.9	13.7
LIVI_7	7.5	7.5	9.7	9.7	10.9	10.9	11.0	10.1	13.1	12.3	14.4	13.5
Madi_to_Mande	11.0	11.0	13.1	13.1	14.3	14.3	13.8	13.6	16.7	15.7	18.3	16.9
Madisonville_1	11.7	11.7	14.6	14.6	16.1	16.1	13.5	13.5	15.8	15.8	16.9	16.9
Mandeville_1	11.0	11.0	13.1	13.1	14.3	14.3	14.9	13.6	19.1	15.7	21.4	16.9
NOE	-5.8	-5.8	0.5	0.5	10.9	10.9	-0.1	-5.8	16.0	0.5	16.0	10.9
NOE_Metro	-5.1	-5.1	-4.8	-4.8	-3.0	-3.0	-5.0	-5.1	16.0	-4.8	16.0	-3.0
ORLE_13a	14.6	14.6	17.8	17.8	19.4	19.4	17.9	17.2	21.5	20.4	23.8	22.0
PLAQ_16s	19.2	19.2	25.3	25.3	30.0	30.0	21.4	21.8	27.8	27.8	31.8	31.8
Slidell_3	11.5	11.5	15.1	15.1	16.8	16.8	13.4	13.4	16.8	16.8	18.5	18.5
Slidell_4	14.1	14.1	18.3	18.3	20.4	20.4	20.5	16.7	24.3	20.9	26.5	23.0
St_Bernard_developed	-0.1	-0.1	4.3	4.3	10.6	10.6	2.3	-0.1	16.0	4.3	16.0	10.6
St_Bernard_wetland	2.4	2.4	5.2	5.2	10.6	10.6	4.5	2.4	16.0	5.2	16.0	10.6
St_Charles_Norco	4.4	4.4	16.0	16.0	16.0	16.0	11.5	4.4	17.3	16.0	18.6	16.0
St_Charles_rest	2.1	2.1	16.0	16.0	16.0	16.0	11.5	2.1	17.3	16.0	18.6	16.0
STJO_10b	10.6	10.6	12.9	12.9	14.1	14.1	13.3	13.2	15.6	15.5	16.7	16.7
STJO_8c	9.4	9.4	12.2	12.2	14.0	14.0	12.7	12.0	15.4	12.0	17.2	16.6
STTA_10e	12.2	12.2	16.2	16.2	18.2	18.2	13.3	13.3	16.7	16.7	18.6	18.6
STTA_9a	10.4	10.4	12.7	12.7	14.0	14.0	13.2	13.0	15.6	15.3	17.5	16.6
TANG_10b	11.0	11.0	13.6	13.6	15.0	15.0	13.7	13.6	16.3	16.2	17.8	17.6
West_Lacombe_2	10.5	10.5	13.5	13.5	15.0	15.0	13.2	13.1	15.8	15.8	17.3	17.3
Evaluation Parameters	Confidence Level:			90%		Levee Design:			No Friction Waves			
	Future Relative Sea Level Rise:			2.6 feet		Levee Overtopping:			No Friction Waves			

* With and without project base conditions (2010) are the same for coastal restoration only plans.

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Planning Unit:	1	Alt. No.:	PU1-NS-100	Category:	Coastal Restoration + Nonstructural Measures
Alternative Description:	Sustain coastal landscape through restoration. Implement comprehensive 100-year nonstructural measures.				
Coastal Component:	R2 (pulsed diversions)		Nonstructural Component:		100-yr stand alone measures
Structural Component:	No new levees or increases in risk reduction level for existing levees.				

Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	873	32,289	204	79	542	21	313	134	51
		Mid		35,151	319	212	1,146	54	267	130	48
		Low		39,672	732	687	3,236	180	221	126	43
2	High RSLR High Employment Dispersed Population	High	885	32,854	222	164	750	42	313	134	51
		Mid		35,717	354	370	1,628	97	267	129	45
		Low		40,410	834	740	3,430	197	221	123	40
3	Low RSLR Business-as-Usual Compact Population	High	844	30,285	201	74	551	21	313	134	51
		Mid		33,272	317	195	1,187	53	267	130	48
		Low		37,927	724	607	3,186	169	221	126	43
4	High RSLR Business-as-Usual Compact Population	High	866	30,673	216	143	751	42	313	134	51
		Mid		33,684	346	326	1,636	95	267	129	45
		Low		38,414	803	651	3,351	183	221	123	40

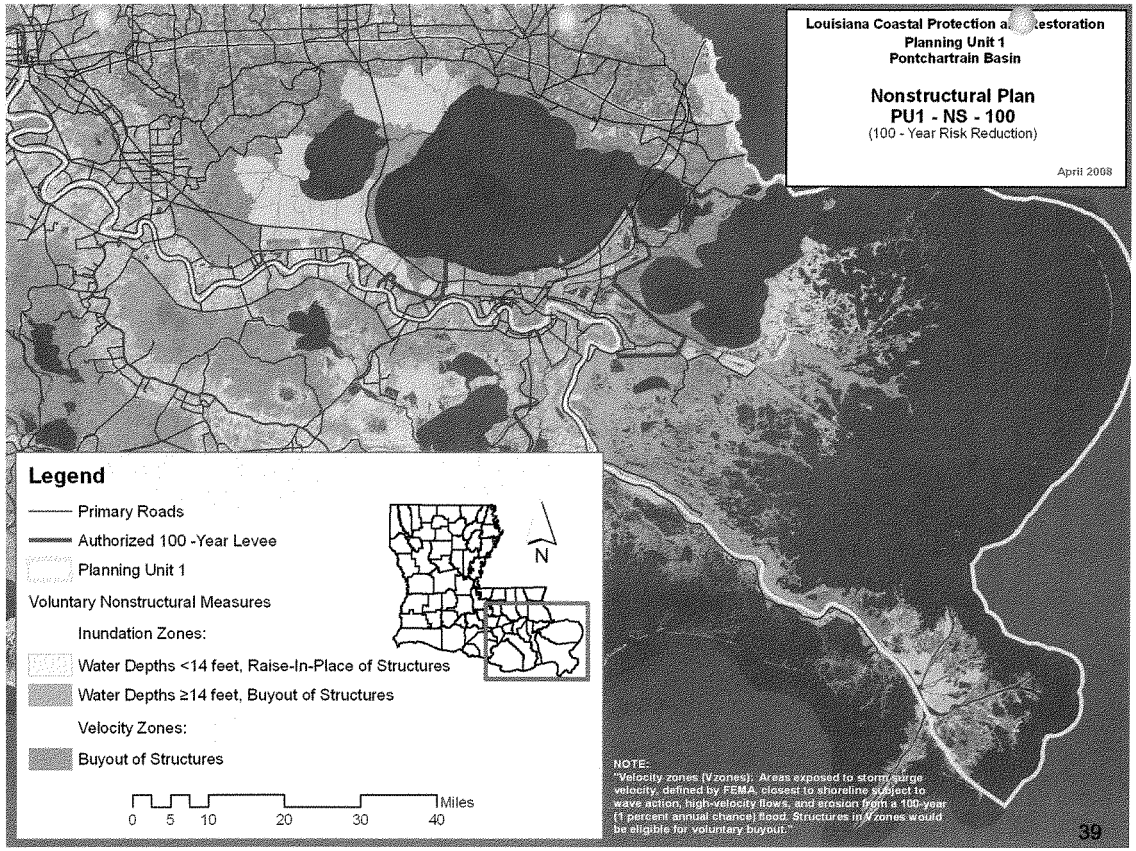
Other Results			Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Construction Time (years)		15	After 50 yrs (% of baseline)	106	104	106	104
Direct Wetland Impacts (acres)		0	After 100 yrs (% of baseline)	104	95	104	95
Indirect Impacts (unitless)		0	Present Value of Life Cycle Costs ($ Millions)				
Spatial Integrity (unitless)		0.42	Coastal Component	10,666	10,899	10,666	10,899
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)	Nonstructural Component	6,453	6,453	6,069	6,069
	1 / 2	5,992 6,073	Structural Component	0	0	0	0
	3 / 4	5,857 5,939	Total Project	17,119	17,352	16,735	16,968

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)								Planning Unit 1
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4	
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj
10-year	1,215	490	1,472	529	1,081	372	1,345	399
100-year	11,935	2,191	34,000	8,386	9,879	1,945	26,076	6,799
400-year	89,937	50,601	116,204	55,036	62,688	37,766	80,694	40,722
1,000-year	118,260	74,874	122,423	78,489	81,963	54,169	84,515	56,320
2,000-year	122,343	115,364	125,886	119,181	84,351	80,708	86,336	82,932

Nonstructural Plan

100-year Design

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels.


Louisiana Coastal Protection a estoration
Planning Unit 1
Pontchartrain Basin
Nonstructural Plan
PU1 - NS - 100
(100 - Year Risk Reduction)
April 2008
Legend
Primary Roads
Authorized 100 -Year Levee
Planning Unit 1
Voluntary Nonstructural Measures
Inundation Zones:
Water Depths <14 feet, Raise-In-Place of Structures
Water Depths ≥14 feet, Buyout of Structures
Velocity Zones:
Buyout of Structures
N
0 5 10 20 30 40
Miles
NOTE:
"Velocity zones (Vzones): Areas exposed to storm surge velocity, defined by FEMA, closest to shoreline subject to wave action, high-velocity flows, and erosion from a 100-year (1 percent annual chance) flood. Structures in V zones would be eligible for voluntary buyout."
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Planning Unit:	1	Alt. No.:	PU1-NS-400	Category:	Coastal Restoration + Nonstructural Measures
Alternative Description:	Sustain coastal landscape through restoration. Implement comprehensive 400-year nonstructural measures.				
Coastal Component:	R2 (pulsed diversions)		Nonstructural Component:		400-yr stand alone measures
Structural Component:	No new levees or increases in risk reduction level for existing levees.				

Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	1,761	31,188	167	45	413	13	313	134	51
		Mid		34,018	229	91	642	23	267	130	48
		Low		38,517	463	343	1,760	82	221	126	43
2	High RSLR High Employment Dispersed Population	High	1,773	31,753	169	48	421	13	313	134	51
		Mid		34,583	236	120	722	31	267	129	45
		Low		39,255	482	365	1,818	88	221	123	40
3	Low RSLR Business-as-Usual Compact Population	High	1,949	29,321	166	47	432	13	313	134	51
		Mid		32,274	232	96	692	25	267	130	48
		Low		36,904	466	341	1,810	81	221	126	43
4	High RSLR Business-as-Usual Compact Population	High	1,971	29,708	168	49	439	14	313	134	51
		Mid		32,685	238	122	759	32	267	129	45
		Low		37,391	480	359	1,855	86	221	123	40

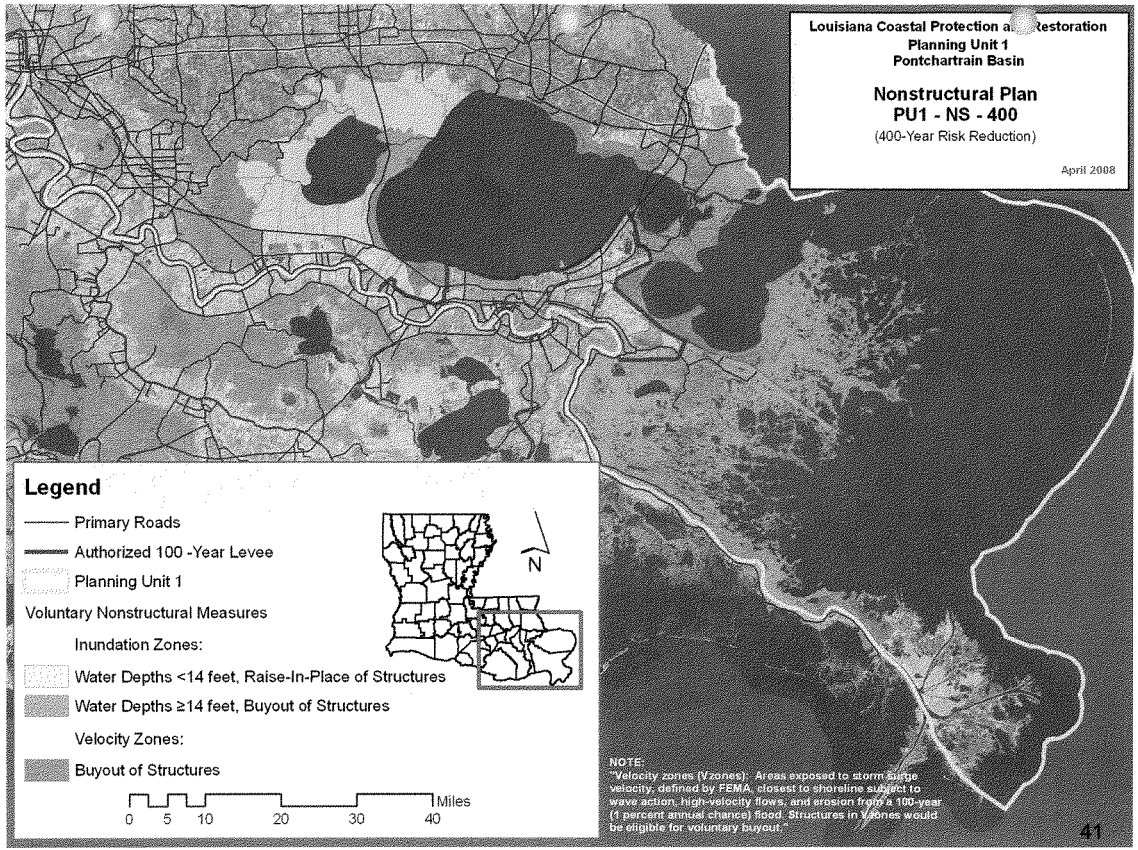
Other Results			Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Construction Time (years)		15	After 50 yrs (% of baseline)	106	104	106	104
Direct Wetland Impacts (acres)		0	After 100 yrs (% of baseline)	104	95	104	95
Indirect Impacts (unitless)		0	Present Value of Life Cycle Costs ($ Millions)				
Spatial Integrity (unitless)		0.42	Coastal Component	10,666	10,899	10,666	10,899
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)	Nonstructural Component	23,873	23,873	27,758	27,758
	1 / 2	12,088	Structural Component	0	0	0	0
	3 / 4	13,448	Total Project	34,538	34,772	38,423	38,657

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)								Planning Unit 1
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4	
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj
10-year	1,215	246	1,472	283	1,081	162	1,345	186
100-year	11,935	804	34,000	1,219	9,879	657	26,076	987
400-year	89,937	5,450	116,204	13,075	62,688	4,087	80,694	9,940
1,000-year	118,260	61,995	122,423	67,873	81,963	44,770	84,515	48,444
2,000-year	122,343	106,842	125,886	112,307	84,351	74,337	86,336	77,619

Nonstructural Plan

400-year Design

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels


Louisiana Coastal Protection a Restoration
Planning Unit 1
Pontchartrain Basin
Nonstructural Plan
PU1 - NS - 400
(400-Year Risk Reduction)
April 2008
Legend
Primary Roads
Authorized 100 -Year Levee
Planning Unit 1
Voluntary Nonstructural Measures
Inundation Zones:
Water Depths <14 feet, Raise-In-Place of Structures
Water Depths ≥14 feet, Buyout of Structures
Velocity Zones:
Buyout of Structures
N
0 5 10 20 30 40
Miles
NOTE:
"Velocity zones (V zones): Areas exposed to storm surge velocity, defined by FEMA, closest to shoreline subject to wave action, high-velocity flows, and erosion from a 100-year (1 percent annual chance) flood. Structures in V zones would be eligible for voluntary buyout."
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Planning Unit:	1	Alt. No.:	PU1-NS-1000	Category:	Coastal Restoration + Nonstructural Measures
Alternative Description:	Sustain coastal landscape through restoration. Implement comprehensive 1000-year nonstructural measures.				
Coastal Component:	R2 (pulsed diversions)			Nonstructural Component:	1000-yr stand alone measures
Structural Component:	No new levees or increases in risk reduction level for existing levees.				

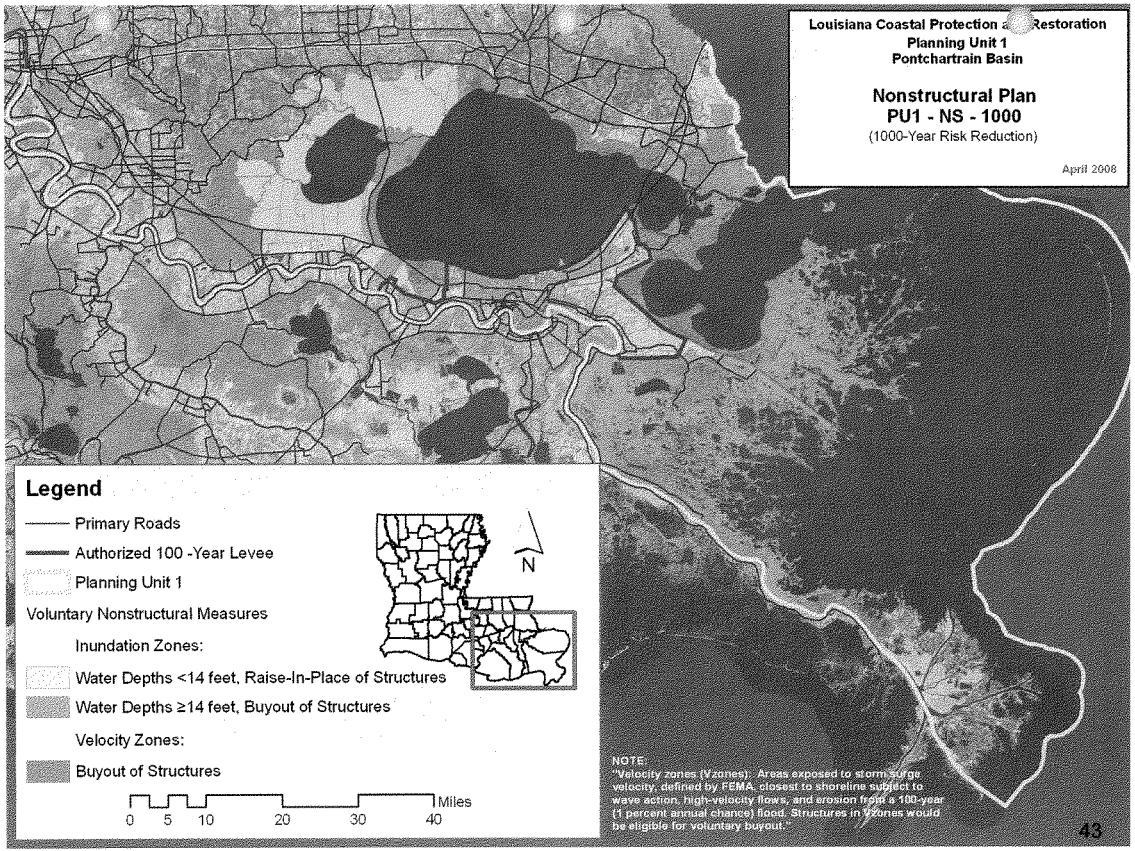
Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	2,535	25,999	151	44	411	13	313	134	51
		Mid		28,761	211	83	613	21	267	130	48
		Low		33,107	384	262	1,370	58	221	126	43
2	High RSLR High Employment Dispersed Population	High	2,547	26,564	153	44	411	13	313	134	51
		Mid		29,326	214	89	629	23	267	129	45
		Low		33,845	391	276	1,414	62	221	123	40
3	Low RSLR Business-as-Usual Compact Population	High	2,595	25,257	152	46	430	13	313	134	51
		Mid		28,162	217	89	664	23	267	130	48
		Low		32,686	395	271	1,436	60	221	126	43
4	High RSLR Business-as-Usual Compact Population	High	2,617	25,644	154	47	430	13	313	134	51
		Mid		28,574	219	94	677	24	267	129	45
		Low		33,173	401	282	1,469	63	221	123	40

Other Results			
Construction Time (years)			15
Direct Wetland Impacts (acres)			0
Indirect Impacts (unitless)			0
Spatial Integrity (unitless)			0.42
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)	
	1 / 2	17,406	17,488
	3 / 4	17,888	17,969

Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
After 50 yrs (% of baseline)	106	104	106	104
After 100 yrs (% of baseline)	104	95	104	95
Present Value of Life Cycle Costs ($ Millions)				
Coastal Component	10,666	10,899	10,666	10,899
Nonstructural Component	39,066	39,066	40,442	40,442
Structural Component	0	0	0	0
Total Project	49,732	49,966	51,107	51,341

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 1
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	
10-year	1,215	139	1,472	175	1,081	90	1,345	114	Nonstructural Plan
100-year	11,935	618	34,000	721	9,879	514	26,076	600	
400-year	89,937	2,090	116,204	3,188	62,688	1,761	80,694	2,579	
1,000-year	118,260	5,057	122,423	14,723	81,963	3,981	84,515	10,921	1000-year Design
2,000-year	122,343	89,283	125,886	97,921	84,351	63,811	86,336	69,581	

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels.


Louisiana Coastal Protection and Restoration
Planning Unit 1
Pontchartrain Basin
Nonstructural Plan
PU1 - NS - 1000
(1000-Year Risk Reduction)
April 2008
Legend
Primary Roads
Authorized 100 -Year Levee
Planning Unit 1
Voluntary Nonstructural Measures
Inundation Zones:
Water Depths <14 feet, Raise-In-Place of Structures
Water Depths ≥14 feet, Buyout of Structures
Velocity Zones:
Buyout of Structures
N
0 5 10 20 30 40
Miles
NOTE:
"Velocity zones (Vzones): Areas exposed to storm surge velocity, defined by FEMA, closest to shoreline subject to wave action, high-velocity flows, and erosion from a 100-year (1 percent annual chance) flood. Structures in Vzones would be eligible for voluntary buyout."
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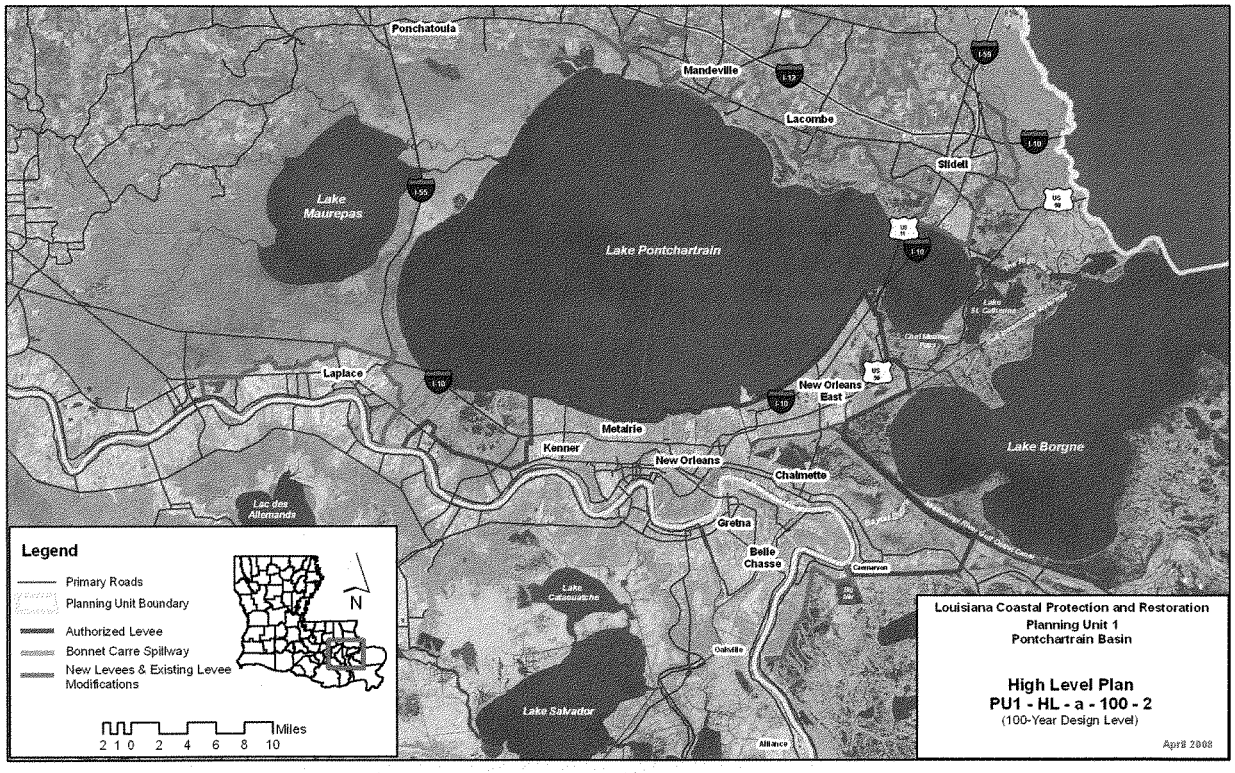
Planning Unit:	1	Alt. No.:	PU1-HL-a-100-2	Category:	Coastal Restoration + Structural Measures
Alternative Description:	Sustain coastal landscape through restoration and construct high level plan providing 100-year design level of risk reduction to Northshore of Lake Pontchartrain, upper Plaquemines, and Laplace.				
Coastal Component:	R2 (pulsed diversions)		Nonstructural Component:		None
Structural Component:	See alternative description above.				

Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	1,525	31,894	318	164	1,085	46	342	141	51
		Mid		34,647	468	368	1,823	94	312	138	50
		Low		39,955	950	890	4,019	234	282	132	43
2	High RSLR High Employment Dispersed Population	High	1,540	32,301	339	327	1,265	62	342	138	51
		Mid		35,358	516	484	2,141	124	312	135	49
		Low		40,911	1,106	1,176	4,810	309	282	129	41
3	Low RSLR Business-as-Usual Compact Population	High	1,525	27,886	311	161	1,089	45	342	141	51
		Mid		30,543	455	317	1,738	83	312	138	50
		Low		35,503	905	721	3,683	194	282	132	43
4	High RSLR Business-as-Usual Compact Population	High	1,540	28,107	327	188	1,175	53	342	138	51
		Mid		31,025	488	362	1,883	96	312	135	49
		Low		36,126	1,002	965	4,300	254	282	129	41

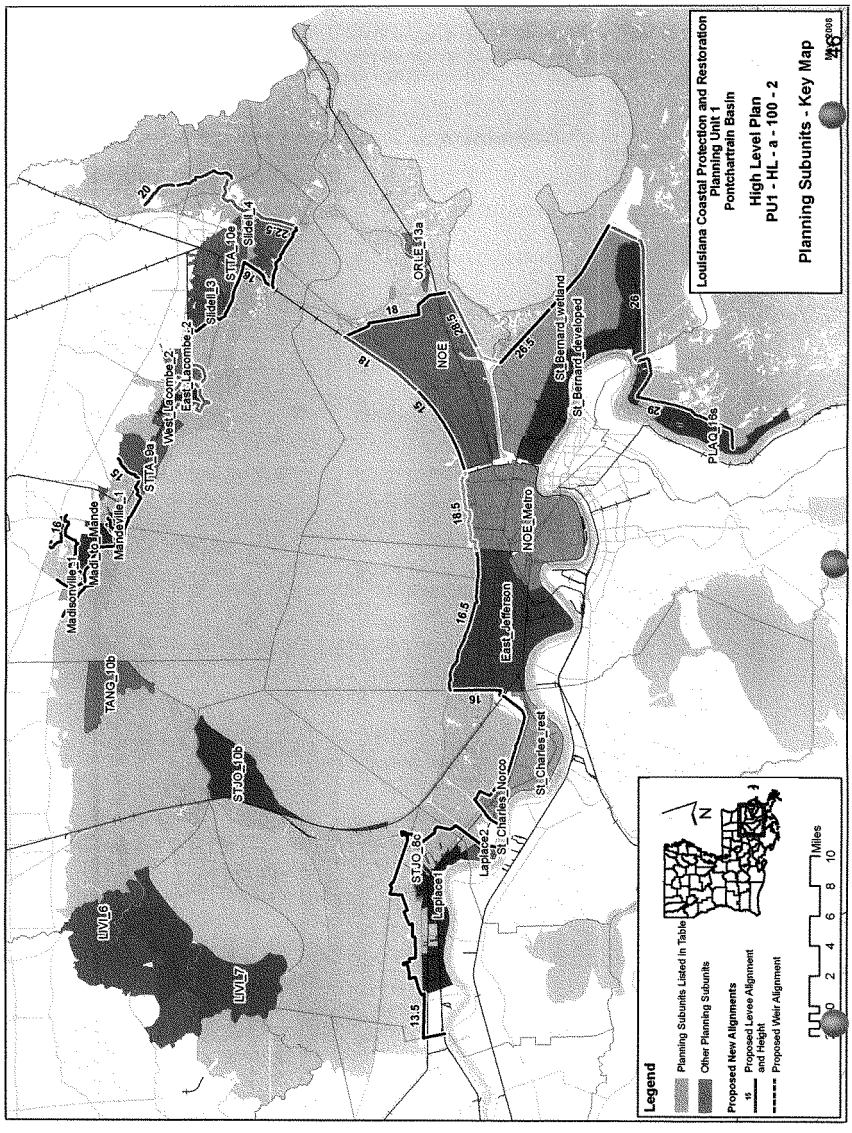
Other Results			Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Construction Time (years)		12	After 50 yrs (% of baseline)	106	104	106	104
Direct Wetland Impacts (acres)		4,200	After 100 yrs (% of baseline)	104	95	104	95
Indirect Impacts (unitless)		-2	Present Value of Life Cycle Costs ($ Millions)				
Spatial Integrity (unitless)		0.42	Coastal Component	10,666	10,899	10,666	10,899
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)	Nonstructural Component	0	0	0	0
	1 / 2	10,764	Structural Component	19,194	19,251	19,194	19,251
	3 / 4	10,764	Total Project	29,860	30,150	29,860	30,150

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 1
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	Structural Plan
10-year	1,215	960	1,472	1,039	1,081	823	1,345	901	High Level Alt
100-year	11,935	2,156	34,000	3,965	9,879	1,879	26,076	2,254	
400-year	89,937	52,133	116,204	52,965	62,688	39,023	80,694	39,216	100-year Design
1,000-year	118,260	72,433	122,423	73,856	81,963	52,486	84,515	52,963	
2,000-year	122,343	116,819	125,886	118,268	84,351	81,010	86,336	81,444	

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels.


Ponchatoula
Mandeville
Lacombe
Slidell
Lake Maurepas
Lake Pontchartrain
Laplace
New Orleans East
Metairie
Kenner
New Orleans
Chalmette
Lake Borgne
Lac des Allemands
Gretna
Belle Chasse
Lake Salvador
Legend
Primary Roads
Planning Unit Boundary
Authorized Levee
Bonnet Carre Spillway
New Levees & Existing Levee Modifications
N
Miles
2 1 0 2 4 6 8 10
Louisiana Coastal Protection and Restoration
Planning Unit 1
Pontchartrain Basin
High Level Plan
PU1 - HL - a - 100 - 2
(100-Year Design Level)
April 2008

1688


Louisiana Coastal Protection and Restoration
Planning Unit 1
Pontchartrain Basin
High Level Plan
PU1 - HL - a - 100 - 2
Planning Subunits - Key Map
Legend
Planning Subunits Listed in Table
Other Planning Subunits
Proposed New Alignments
Proposed Levee Alignment and Height
Proposed Weir Alignment
Miles
0 2 4 6 8 10
N
LIVL6
LIVL7
STJO_10b
TANG_10b
Madisonville_1
Madi_to_Mande
Mandeville_1
STTA_9a
West_Lacombe_2
East_Lacombe_2
Slidell_3
Slidell_4
STTA_10e
ORLE_13a
NOE
St_Bernard_wetland
St_Bernard_developed
PLAQ_16s
NOE_Metro
East_Jefferson
St_Charles_rest
St_Charles_Norco
Laplace2
Laplace1
STJO_8c
13.5
16
16.5
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22.5
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26.5
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Alternative: PU1-HL-a-100-2

Water Surface Elevations (feet - NAVD88 2004.65)

Planning Sub Unit	2010 (Base) Conditions						2060 (Future) Conditions					
	100-yr Event		400-year Event		1,000-yr Event		100-yr Event		400-year Event		1,000-yr Event	
	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project
East_Jefferson	-5.1	-5.1	-1.3	-1.3	4.4	4.4	-2.6	-5.1	16.0	-1.3	16.0	4.4
East_Lacombe_2	10.9	5.2	14.3	15.0	15.9	15.0	17.3	5.2	21.7	15.0	23.6	15.0
Laplace1	9.4	4.4	12.2	13.5	14.0	14.0	12.4	4.4	15.0	13.5	16.8	14.0
Laplace2	8.5	4.4	11.0	13.5	12.8	13.5	11.2	4.4	14.3	13.5	16.2	13.5
LIVI_6	7.3	7.3	9.7	9.7	11.1	11.1	10.3	9.9	12.8	12.3	13.9	13.7
LIVI_7	7.5	7.5	9.7	9.7	10.9	10.9	11.0	10.1	13.1	12.3	14.4	13.5
Madi_to_Mande	11.0	5.9	13.1	13.1	14.3	16.0	13.8	5.9	16.7	13.1	18.3	16.0
Madisonville_1	11.7	6.4	14.6	16.0	16.1	16.0	13.5	6.4	15.8	16.0	16.9	16.0
Mandeville_1	11.0	6.8	13.1	15.0	14.3	15.0	14.9	6.8	19.1	15.0	21.4	15.0
NOE	-5.8	-5.8	0.5	0.5	10.9	10.9	-0.1	-5.8	16.0	0.5	16.0	10.9
NOE_Metro	-5.1	-5.1	-4.8	-4.8	-3.0	-3.0	-5.0	-5.1	16.0	-4.8	16.0	-3.0
ORLE_13a	14.6	14.6	17.8	17.8	19.4	19.4	17.9	17.2	21.5	20.4	23.8	22.0
PLAQ_16s	19.2	0.4	25.3	11.3	30.0	18.0	21.4	0.4	27.8	11.3	31.8	18.0
Slidell_3	11.5	4.6	15.1	16.5	16.8	16.5	13.4	4.6	16.8	16.5	18.5	16.5
Slidell_4	14.1	6.2	18.3	16.5	20.4	16.5	20.5	6.2	24.3	16.5	26.5	16.5
St_Bernard_developed	-0.1	-0.1	4.3	4.3	10.6	10.6	2.3	-0.1	16.0	4.3	16.0	10.6
St_Bernard_wetland	2.4	2.4	5.2	5.2	10.6	10.6	4.5	2.4	16.0	5.2	16.0	10.6
St_Charles_Norco	4.4	4.4	16.0	16.0	16.0	16.0	11.5	4.4	17.3	16.0	18.6	16.0
St_Charles_rest	2.1	2.1	16.0	16.0	16.0	16.0	11.5	2.1	17.3	16.0	18.6	16.0
STJO_10b	10.6	10.6	12.9	12.9	14.1	14.1	13.3	13.2	15.6	15.5	16.7	16.7
STJO_8c	9.4	4.4	12.2	13.5	14.0	14.0	12.7	4.4	15.4	13.5	17.2	14.0
STTA_10e	12.2	4.6	16.2	16.5	18.2	16.5	13.3	4.6	16.7	16.5	18.6	16.5
STTA_9a	10.4	10.4	12.7	12.7	14.0	14.0	13.2	13.0	15.6	15.3	17.5	16.6
TANG_10b	11.0	11.0	13.6	13.6	15.0	15.0	13.7	13.6	16.3	16.2	17.8	17.6
West_Lacombe_2	10.5	4.1	13.5	15.0	15.0	15.0	13.2	4.1	15.8	15.0	17.3	15.0

Evaluation Parameters				
	Confidence Level:	90%	Levee Design:	No Friction Waves
	Future Relative Sea Level Rise:	2.6 feet	Levee Overtopping:	No Friction Waves

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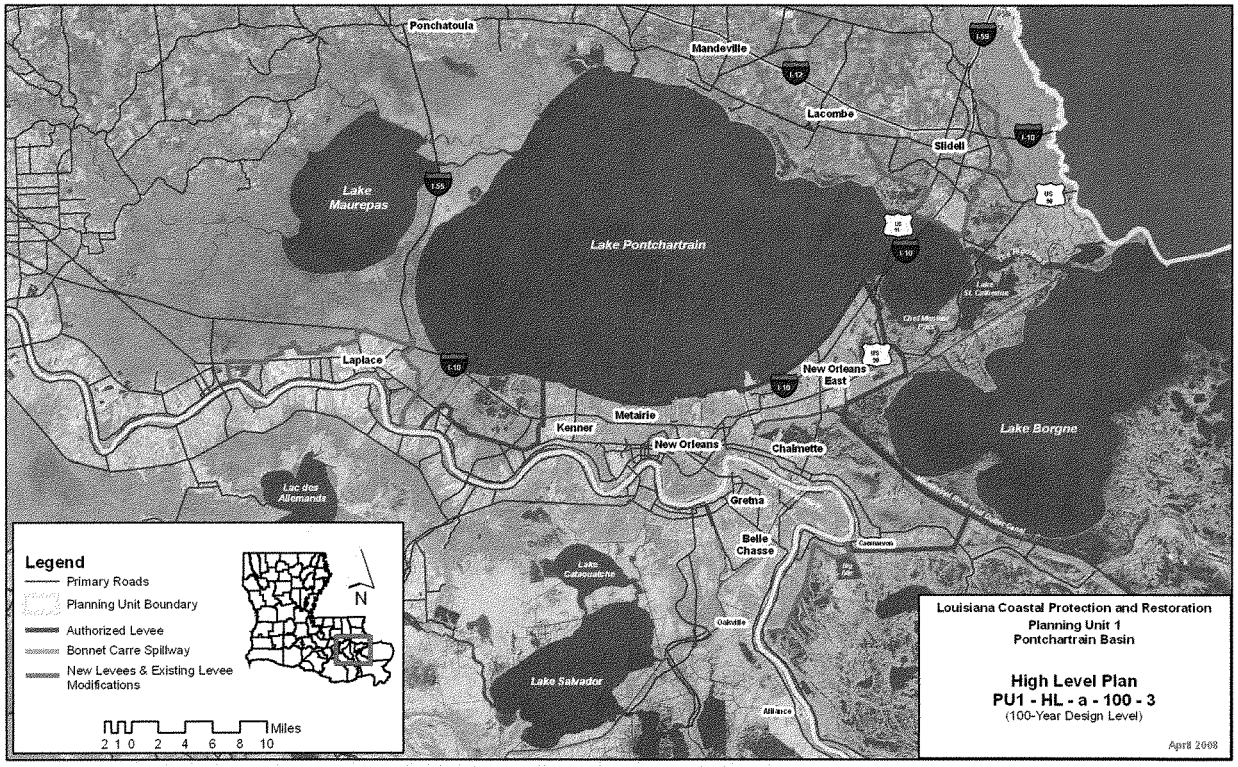
Planning Unit:	1	Alt. No.:	PU1-HL-a-100-3	Category:	Coastal Restoration + Structural Measures
Alternative Description:	Sustain coastal landscape through restoration and construct high level plan providing 100-year design level of risk reduction to Laplace, upper Plaquemines, and Slidell.				
Coastal Component:	R2 (pulsed diversions)		Nonstructural Component:		None
Structural Component:	See alternative description above.				

Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	1,356	32,157	326	169	1,101	47	335	137	51
		Mid		35,012	479	375	1,853	96	305	133	50
		Low		40,309	961	902	4,058	237	275	126	43
2	High RSLR High Employment Dispersed Population	High	1,370	32,670	349	250	1,306	66	335	134	51
		Mid		35,824	531	503	2,201	129	305	128	48
		Low		41,369	1,125	1,198	4,884	315	275	124	40
3	Low RSLR Business-as-Usual Compact Population	High	1,356	28,051	320	165	1,106	46	335	137	51
		Mid		30,784	467	324	1,761	85	305	133	50
		Low		35,750	917	729	3,704	195	275	126	43
4	High RSLR Business-as-Usual Compact Population	High	1,370	28,342	337	197	1,204	55	335	134	51
		Mid		31,336	502	377	1,937	101	305	128	48
		Low		36,442	1,018	983	4,360	259	275	124	40

Other Results			Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Construction Time (years)		12	After 50 yrs (% of baseline)	106	104	106	104
Direct Wetland Impacts (acres)		3,600	After 100 yrs (% of baseline)	104	95	104	95
Indirect Impacts (unitless)		-1	Present Value of Life Cycle Costs ($ Millions)				
Spatial Integrity (unitless)		0.42	Coastal Component	10,666	10,899	10,666	10,899
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)	Nonstructural Component	0	0	0	0
	1 / 2	9,515	9,608	15,893	15,928	15,893	15,928
	3 / 4	9,515	9,608	26,559	26,827	26,559	26,827

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 1
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		Structural Plan
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	High Level Alt
10-year	1,215	1,011	1,472	1,120	1,081	873	1,345	981	100-year Design
100-year	11,935	2,398	34,000	4,571	9,879	2,116	26,076	2,717	
400-year	89,937	52,213	116,204	53,587	62,688	39,049	80,694	39,536	
1,000-year	118,260	72,825	122,423	75,020	81,963	52,668	84,515	53,491	
2,000-year	122,343	117,664	125,886	120,372	84,351	81,362	86,336	82,565	

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels.


Ponchatoula
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Lacombe
Slidell
Lake Maurepas
Lake Pontchartrain
Laplace
New Orleans East
Metairie
Kenner
New Orleans
Chalmette
Lake Borgne
Lac des Allemands
Gretna
Belle Chasse
Lake Catouatchie
Lake Salvador
Alliance
Oakville
Legend
Primary Roads
Planning Unit Boundary
Authorized Levee
Bonnet Carre Spillway
New Levees & Existing Levee Modifications
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Miles
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Louisiana Coastal Protection and Restoration
Planning Unit 1
Pontchartrain Basin
High Level Plan
PU1 - HL - a - 100 - 3
(100-Year Design Level)
April 2008

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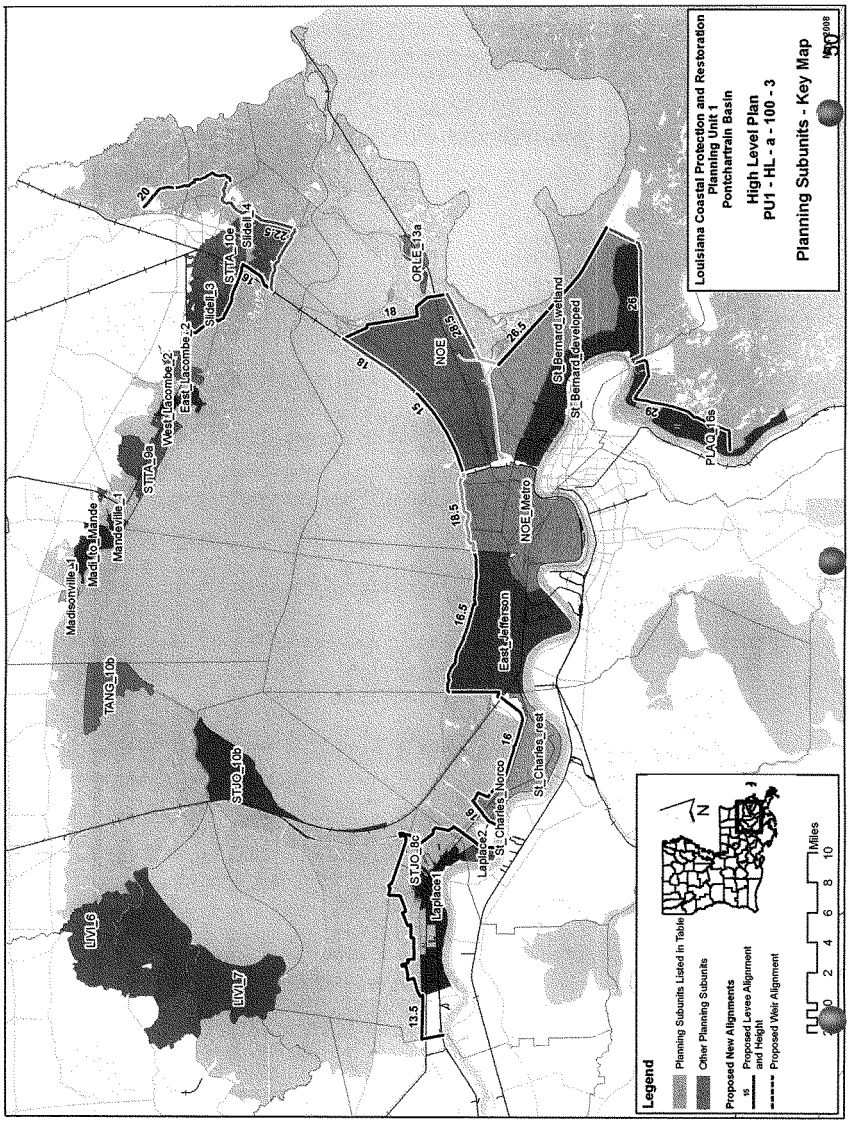
Louisiana Coastal Protection and Restoration
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26.5
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Alternative: PU1-HL-a-100-3

Water Surface Elevations (feet - NAVD88 2004.65)

Planning Sub Unit	2010 (Base) Conditions						2060 (Future) Conditions					
	100-yr Event		400-year Event		1,000-yr Event		100-yr Event		400-year Event		1,000-yr Event	
	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project
East_Jefferson	-5.1	-5.1	-1.3	-1.3	4.4	4.4	-2.6	-5.1	16.0	-1.3	16.0	4.4
East_Lacombe_2	10.9	10.9	14.3	14.3	15.9	15.9	17.3	13.5	21.7	16.9	23.6	18.5
Laplace1	9.4	4.4	12.2	13.5	14.0	14.0	12.4	4.4	15.0	13.5	16.8	14.0
Laplace2	8.5	4.4	11.0	13.5	12.8	13.5	11.2	4.4	14.3	13.5	16.2	13.5
LIVI_6	7.3	7.3	9.7	9.7	11.1	11.1	10.3	9.9	12.8	12.3	13.9	13.7
LIVI_7	7.5	7.5	9.7	9.7	10.9	10.9	11.0	10.1	13.1	12.3	14.4	13.5
Madi_to_Mande	11.0	11.0	13.1	13.1	14.3	14.3	13.8	13.6	16.7	15.7	18.3	16.9
Madisonville_1	11.7	11.7	14.6	14.6	16.1	16.1	13.5	14.3	15.8	17.2	16.9	18.7
Mandeville_1	11.0	11.0	13.1	13.1	14.3	14.3	14.9	13.6	19.1	15.7	21.4	16.9
NOE	-5.8	-5.8	0.5	0.5	10.9	10.9	-0.1	-5.8	16.0	0.5	16.0	10.9
NOE_Metro	-5.1	-5.1	-4.8	-4.8	-3.0	-3.0	-5.0	-5.1	16.0	-4.8	16.0	-3.0
ORLE_13a	14.6	14.6	17.8	17.8	19.4	19.4	17.9	17.2	21.5	20.4	23.8	22.0
PLAQ_16s	19.2	0.4	25.3	11.3	30.0	18.0	21.4	0.4	27.8	11.3	31.8	18.0
Slidell_3	11.5	4.6	15.1	16.5	16.8	16.5	13.4	4.6	16.8	16.5	18.5	16.5
Slidell_4	14.1	6.2	18.3	16.5	20.4	16.5	20.5	6.2	24.3	16.5	26.5	16.5
St_Bernard_developed	-0.1	-0.1	4.3	4.3	10.6	10.6	2.3	-0.1	16.0	4.3	16.0	10.6
St_Bernard_wetland	2.4	2.4	5.2	5.2	10.6	10.6	4.5	2.4	16.0	5.2	16.0	10.6
St_Charles_Norco	4.4	4.4	16.0	16.0	16.0	16.0	11.5	4.4	17.3	16.0	18.6	16.0
St_Charles_rest	2.1	2.1	16.0	16.0	16.0	16.0	11.5	2.1	17.3	16.0	18.6	16.0
STJO_10b	10.6	10.6	12.9	12.9	14.1	14.1	13.3	13.2	15.6	15.5	16.7	16.7
STJO_8c	9.4	4.4	12.2	13.5	14.0	14.0	12.7	4.4	15.4	13.5	17.2	14.0
STTA_10e	12.2	4.6	16.2	16.5	18.2	16.5	13.3	4.6	16.7	16.5	18.6	16.5
STTA_9a	10.4	10.4	12.7	12.7	14.0	14.0	13.2	13.0	15.6	15.3	17.5	16.6
TANG_10b	11.0	11.0	13.6	13.6	15.0	15.0	13.7	13.6	16.3	16.2	17.8	17.6
West_Lacombe_2	10.5	10.5	13.5	13.5	15.0	15.0	13.2	13.1	15.8	16.1	17.3	17.6

Evaluation Parameters				
	Confidence Level:	90%	Levee Design:	No Friction Waves
	Future Relative Sea Level Rise:	2.6 feet	Levee Overtopping:	No Friction Waves

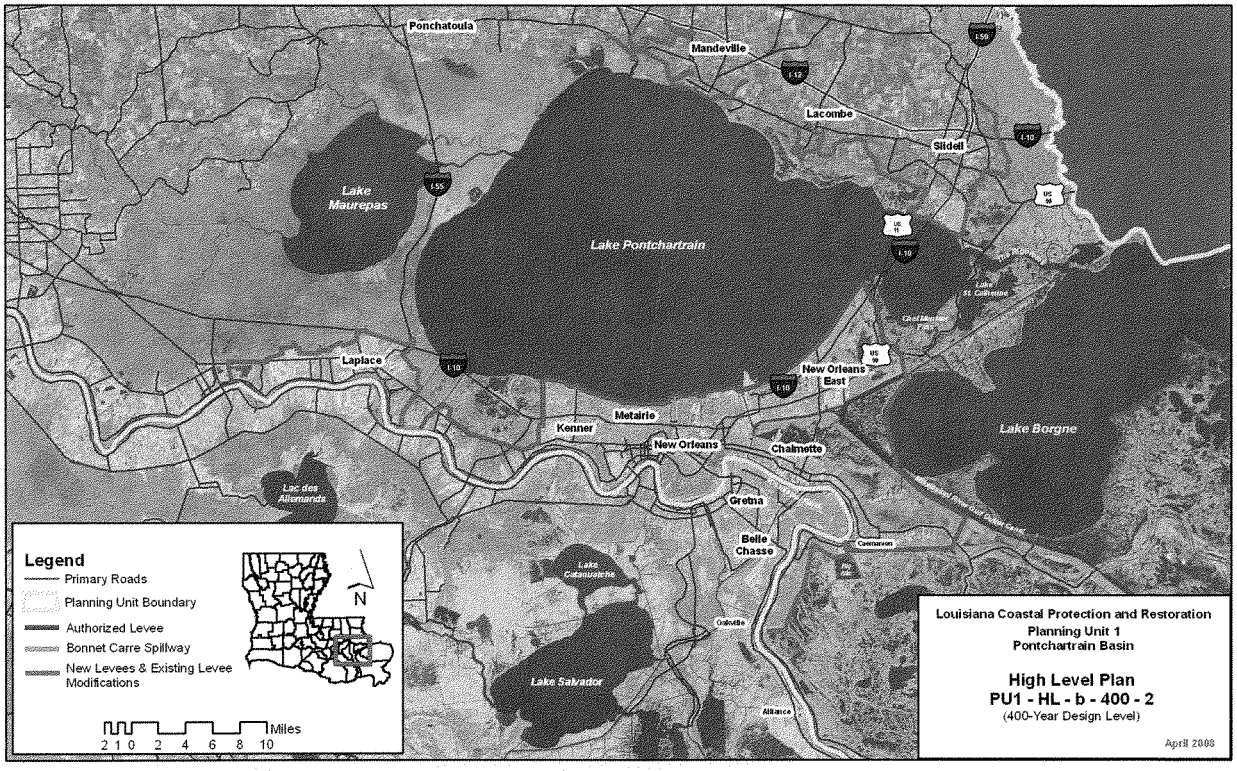
Planning Unit:	1	Alt. No.:	PU1-HL-b-400-2	Category:	Coastal Restoration + Structural Measures
Alternative Description:	Sustain coastal landscape through restoration and construct high level plan providing 400-year design level of risk reduction to the Northshore and Southshore of Lake Pontchartrain, upper Plaquemines, Laplace and Slidell.				
Coastal Component:	R2 (pulsed diversions)			Nonstructural Component:	None
Structural Component:	See alternative description above.				

Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	3,076	32,301	336	176	1,139	49	344	158	52
		Mid		34,414	470	363	1,797	94	314	153	51
		Low		38,544	797	715	3,261	186	284	148	50
2	High RSLR High Employment Dispersed Population	High	3,100	32,792	361	261	1,355	69	344	158	51
		Mid		35,400	533	506	2,193	130	314	150	49
		Low		39,851	1,005	1,138	4,430	298	284	142	46
3	Low RSLR Business-as-Usual Compact Population	High	3,076	28,540	330	173	1,150	48	344	158	52
		Mid		30,596	459	310	1,718	83	314	153	51
		Low		34,436	763	551	2,925	149	284	148	50
4	High RSLR Business-as-Usual Compact Population	High	3,100	28,823	350	211	1,271	60	344	158	51
		Mid		31,293	504	371	1,919	101	314	150	49
		Low		35,325	901	911	3,837	238	284	142	46

Other Results				Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Construction Time (years)			16	After 50 yrs (% of baseline)	106	104	106	104
Direct Wetland Impacts (acres)			6,000	After 100 yrs (% of baseline)	104	95	104	95
Indirect Impacts (unitless)			-2	Present Value of Life Cycle Costs ($ Millions)				
Spatial Integrity (unitless)			0.42	Coastal Component	10,666	10,899	10,666	10,899
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)		Nonstructural Component	0	0	0	0
	1 / 2	21,509	21,675	Structural Component	49,569	49,808	49,569	49,808
	3 / 4	21,509	21,675	Total Project	60,234	60,707	60,234	60,707

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 1
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		Structural Plan
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	High Level Alt
10-year	1,215	958	1,472	1,038	1,081	822	1,345	899	400-year Design
100-year	11,935	1,952	34,000	3,761	9,879	1,695	26,076	2,070	
400-year	89,937	5,474	116,204	6,306	62,688	2,591	80,694	2,784	
1,000-year	118,260	9,482	122,423	10,904	81,963	5,397	84,515	5,875	
2,000-year	122,343	26,064	125,886	27,513	84,351	17,818	86,336	18,252	

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels


Ponchatoula
Mandeville
Lacombe
Slidell
Lake Maurepas
Lake Pontchartrain
Laplace
Metairie
Kenner
New Orleans
New Orleans East
Chalmette
Lake Borgne
Lac des Allemands
Gretna
Belle Chasse
Lake Salvador
Alliance
Legend
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Authorized Levee
Bonnet Carre Spillway
New Levees & Existing Levee Modifications
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Miles
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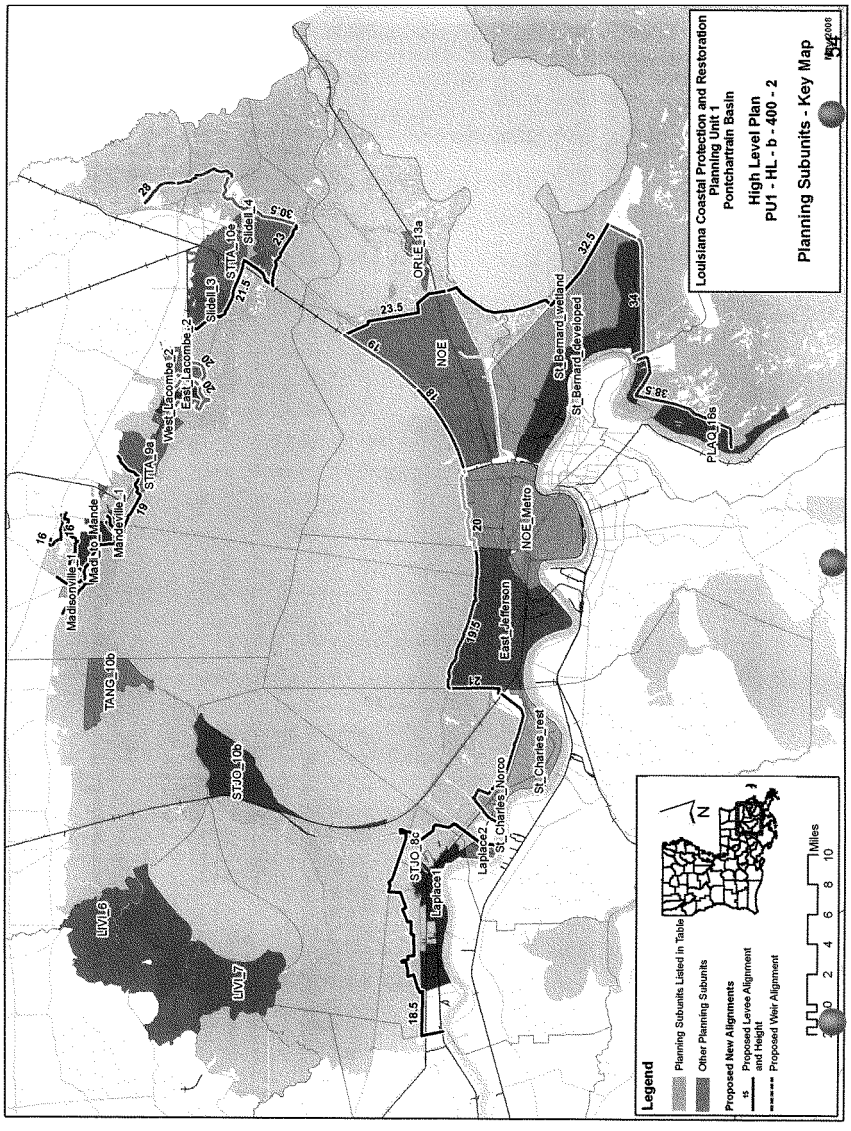
PU1 - HL - b - 400 - 2
(400-Year Design Level)
April 2008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38.5
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24
84

Alternative: PU1-HL-b-400-2
Water Surface Elevations (feet - NAVD88 2004.65)

Planning Sub Unit	2010 (Base) Conditions						2060 (Future) Conditions					
	100-yr Event		400-year Event		1,000-yr Event		100-yr Event		400-year Event		1,000-yr Event	
	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project
East_Jefferson	-5.1	-5.2	-1.3	-5.0	4.4	-4.4	-2.6	-5.2	16.0	-5.0	16.0	-4.4
East_Lacombe_2	10.9	4.7	14.3	5.2	15.9	6.9	17.3	4.7	21.7	5.2	23.6	6.9
Laplace1	9.4	4.1	12.2	4.5	14.0	7.8	12.4	4.1	15.0	4.5	16.8	7.8
Laplace2	8.5	4.1	11.0	4.5	12.8	7.8	11.2	4.1	14.3	4.5	16.2	7.8
LIVI_6	7.3	7.3	9.7	9.7	11.1	11.1	10.3	9.9	12.8	12.3	13.9	13.7
LIVI_7	7.5	7.5	9.7	9.7	10.9	10.9	11.0	10.1	13.1	12.3	14.4	13.5
Madi_to_Mande	11.0	5.3	13.1	5.9	14.3	7.5	13.8	5.3	16.7	5.9	18.3	7.5
Madisonville_1	11.7	5.6	14.6	6.5	16.1	8.8	13.5	5.6	15.8	6.5	16.9	8.8
Mandeville_1	11.0	5.9	13.1	6.8	14.3	9.4	14.9	5.9	19.1	6.8	21.4	9.4
NOE	-5.8	-6.0	0.5	-5.9	10.9	-5.1	-0.1	-6.0	16.0	-5.9	16.0	-5.1
NOE_Metro	-5.1	-5.2	-4.8	-5.0	-3.0	-4.2	-5.0	-5.2	16.0	-5.0	16.0	-4.2
ORLE_13a	14.6	14.6	17.8	17.8	19.4	19.4	17.9	17.2	21.5	20.4	23.8	22.0
PLAQ_16s	19.2	-0.1	25.3	0.4	30.0	2.0	21.4	-0.1	27.8	0.4	31.8	2.0
Slidell_3	11.5	4.3	15.1	4.6	16.8	5.9	13.4	4.3	16.8	4.6	18.5	5.9
Slidell_4	14.1	6.2	18.3	6.2	20.4	6.2	20.5	6.2	24.3	6.2	26.5	6.2
St_Bernard_developed	-0.1	-0.4	4.3	-0.1	10.6	0.8	2.3	-0.4	16.0	-0.1	16.0	0.8
St_Bernard_wetland	2.4	1.7	5.2	1.8	10.6	2.2	4.5	1.7	16.0	1.8	16.0	2.2
St_Charles_Norco	4.4	3.4	16.0	4.5	16.0	4.5	11.5	3.4	17.3	4.5	18.6	4.5
St_Charles_rest	2.1	1.9	16.0	2.1	16.0	4.2	11.5	1.9	17.3	2.1	18.6	4.2
STJO_10b	10.6	10.6	12.9	12.9	14.1	14.1	13.3	13.2	15.6	15.5	16.7	16.7
STJO_8c	9.4	4.1	12.2	4.5	14.0	7.8	12.7	4.1	15.4	4.5	17.2	7.8
STTA_10e	12.2	4.3	16.2	4.6	18.2	5.9	13.3	4.3	16.7	4.6	18.6	5.9
STTA_9a	10.4	10.4	12.7	12.7	14.0	14.0	13.2	13.0	15.6	15.3	17.5	16.6
TANG_10b	11.0	11.0	13.6	13.6	15.0	15.0	13.7	13.6	16.3	16.2	17.8	17.6
West_Lacombe_2	10.5	3.6	13.5	4.1	15.0	5.9	13.2	3.6	15.8	4.1	17.3	5.9
Evaluation Parameters	Confidence Level:			90%		Levee Design:			No Friction Waves			
	Future Relative Sea Level Rise:			2.6 feet		Levee Overtopping:			No Friction Waves			

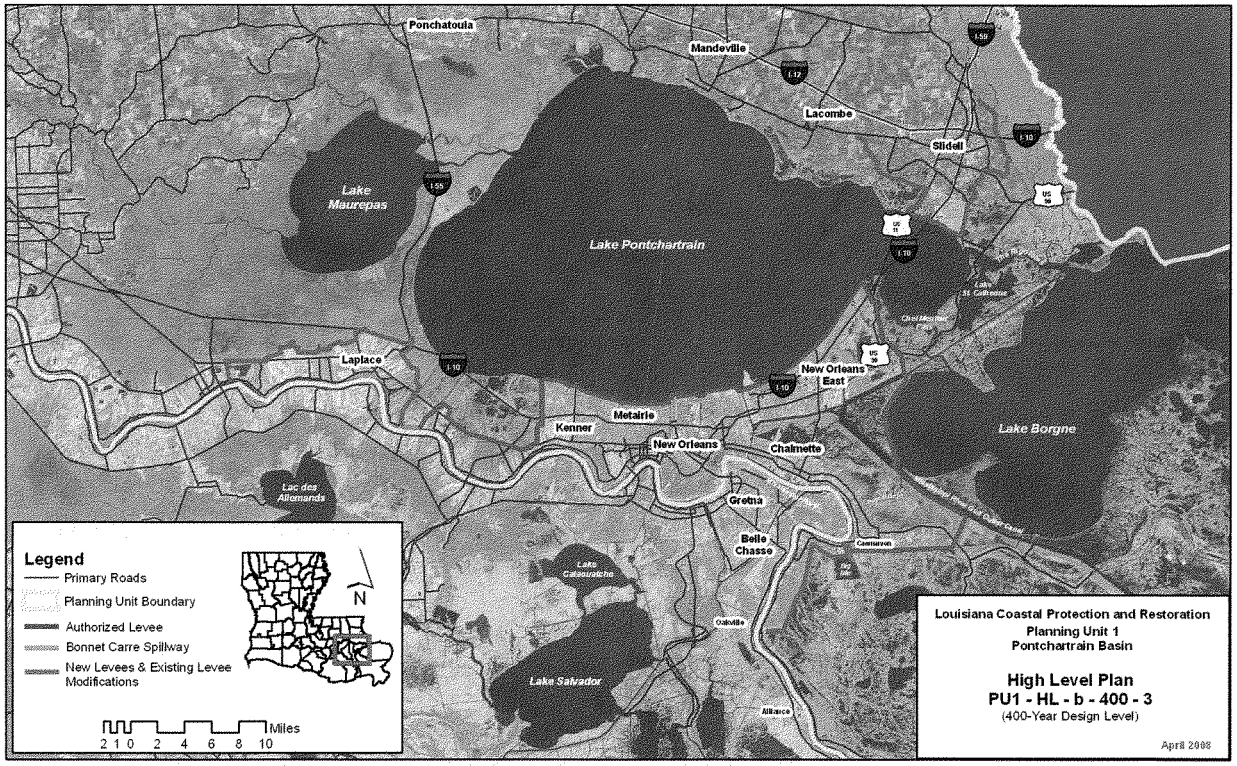
Planning Unit:	1	Alt. No.:	PU1-HL-b-400-3	Category:	Coastal Restoration + Structural Measures
Alternative Description:	Sustain coastal landscape through restoration and construct high level plan providing 400-year design level of risk reduction to Southshore of Lake Pontchartrain, upper Plaquemines, Laplace and Slidell.				
Coastal Component:	R2 (pulsed diversions)		Nonstructural Component:		None
Structural Component:	See alternative description above.				

Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	2,837	32,516	342	179	1,152	49	307	143	51
		Mid		34,727	480	370	1,822	96	307	143	50
		Low		38,940	810	729	3,306	190	277	140	48
2	High RSLR High Employment Dispersed Population	High	2,860	33,092	369	271	1,388	71	337	143	51
		Mid		35,795	546	522	2,243	135	307	141	49
		Low		40,330	1,025	1,160	4,504	304	277	133	45
3	Low RSLR Business-as-Usual Compact Population	High	2,837	28,675	337	177	1,164	49	307	143	51
		Mid		30,806	469	316	1,740	85	307	143	50
		Low		34,720	775	561	2,966	152	277	140	48
4	High RSLR Business-as-Usual Compact Population	High	2,860	29,014	359	218	1,295	61	337	143	51
		Mid		31,559	516	384	1,966	105	307	141	49
		Low		35,665	918	930	3,910	244	277	133	45

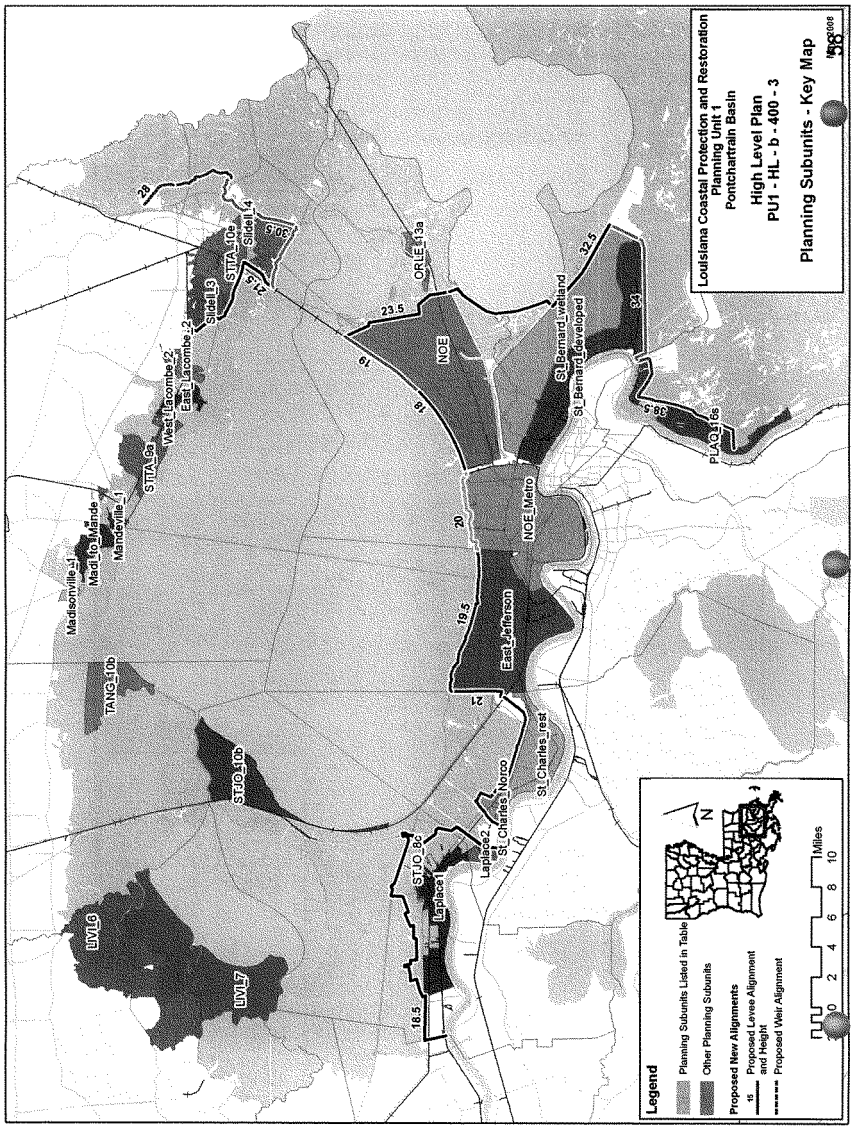
Other Results			Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Construction Time (years)		16	After 50 yrs (% of baseline)	106	104	106	104
Direct Wetland Impacts (acres)		5,500	After 100 yrs (% of baseline)	104	95	104	95
Indirect Impacts (unitless)		-2	Present Value of Life Cycle Costs ($ Millions)				
Spatial Integrity (unitless)		0.42	Coastal Component	10,666	10,899	10,666	10,899
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)	Nonstructural Component	0	0	0	0
	1 / 2	19,790	Structural Component	44,895	45,103	44,895	45,103
	3 / 4	19,790	Total Project	55,561	56,002	55,561	56,002

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 1
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	Structural Plan
10-year	1,215	1,011	1,472	1,120	1,081	873	1,345	981	High Level Alt
100-year	11,935	2,209	34,000	4,382	9,879	1,946	26,076	2,547	
400-year	89,937	6,516	116,204	7,890	62,688	3,270	80,694	3,757	400-year Design
1,000-year	118,260	11,051	122,423	13,246	81,963	6,320	84,515	7,143	
2,000-year	122,343	28,009	125,886	30,717	84,351	18,776	86,336	19,980	

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels.


Ponchatoula
Mandeville
Lacombe
Slidell
Lake Maurepas
Lake Pontchartrain
Laplace
Kenner
Metairie
New Orleans
New Orleans East
Chalmette
Lake Borgne
Lac des Allemands
Gretna
Belle Chasse
Lake Salvador
Legend
Primary Roads
Planning Unit Boundary
Authorized Levee
Bonnet Carre Spillway
New Levees & Existing Levee Modifications
N
2 1 0 2 4 6 8 10 Miles
Louisiana Coastal Protection and Restoration
Planning Unit 1
Pontchartrain Basin
High Level Plan
PU1 - HL - b - 400 - 3
(400-Year Design Level)
April 2008

1700


Louisiana Coastal Protection and Restoration
Planning Unit 1
Pontchartrain Basin
High Level Plan
PU1 - HL - b - 400 - 3
Planning Subunits - Key Map
Legend
Planning Subunits Listed in Table
Other Planning Subunits
Proposed New Alignments
Proposed Levee Alignment and Height
Proposed Weir Alignment
Miles
0 2 4 6 8 10
N
LIVL6
LIVL7
STJO_10b
TANG_10b
Madisonville_1
Madi_to_Mande
Mandeville_1
STTA_9a
West_Lacombe_2
East_Lacombe_2
Slidell_3
Slidell_4
STTA_10c
ORLE_13a
NOE
NOE_Metro
East_Jefferson
St_Charles_rest
St_Charles_Norco
Laplace1
Laplace2
STJO_8c
St_Bernard_wetland
St_Bernard_developed
PLAQ_16s
18.5
19.5
20
21
23.5
28
30.5
32.5
38.5

Alternative: PU1-HL-b-400-3

Water Surface Elevations (feet - NAVD88 2004.65)

Planning Sub Unit	2010 (Base) Conditions						2060 (Future) Conditions					
	100-yr Event		400-year Event		1,000-yr Event		100-yr Event		400-year Event		1,000-yr Event	
	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project
East_Jefferson	-5.1	-5.2	-1.3	-5.0	4.4	-4.4	-2.6	-5.2	16.0	-5.0	16.0	-4.4
East_Lacombe_2	10.9	10.9	14.3	14.3	15.9	15.9	17.3	13.5	21.7	16.9	23.6	18.5
Laplace1	9.4	4.1	12.2	4.5	14.0	7.8	12.4	4.1	15.0	4.5	16.8	7.8
Laplace2	8.5	4.1	11.0	4.5	12.8	7.8	11.2	4.1	14.3	4.5	16.2	7.8
LIVI_6	7.3	7.3	9.7	9.7	11.1	11.1	10.3	9.9	12.8	12.3	13.9	13.7
LIVI_7	7.5	7.5	9.7	9.7	10.9	10.9	11.0	10.1	13.1	12.3	14.4	13.5
Madi_to_Mande	11.0	11.0	13.1	13.1	14.3	14.3	13.8	13.6	16.7	15.7	18.3	16.9
Madisonville_1	11.7	11.7	14.6	14.6	16.1	16.1	13.5	14.3	15.8	17.2	16.9	18.7
Mandeville_1	11.0	11.0	13.1	13.1	14.3	14.3	14.9	13.6	19.1	15.7	21.4	16.9
NOE	-5.8	-6.0	0.5	-5.7	10.9	-4.2	-0.1	-6.0	16.0	-5.7	16.0	-4.2
NOE_Metro	-5.1	-5.2	-4.8	-5.0	-3.0	-4.2	-5.0	-5.2	16.0	-5.0	16.0	-4.2
ORLE_13a	14.6	14.6	17.8	17.8	19.4	19.4	17.9	17.2	21.5	20.4	23.8	22.0
PLAQ_16s	19.2	-0.1	25.3	0.4	30.0	2.0	21.4	-0.1	27.8	0.4	31.8	2.0
Slidell_3	11.5	4.3	15.1	4.6	16.8	5.9	13.4	4.3	16.8	4.6	18.5	5.9
Slidell_4	14.1	6.2	18.3	6.2	20.4	6.2	20.5	6.2	24.3	6.2	26.5	6.2
St_Bernard_developed	-0.1	-0.4	4.3	-0.1	10.6	0.8	2.3	-0.4	16.0	-0.1	16.0	0.8
St_Bernard_wetland	2.4	2.3	5.2	2.5	10.6	2.8	4.5	2.3	16.0	2.5	16.0	2.8
St_Charles_Norco	4.4	3.4	16.0	4.5	16.0	4.5	11.5	3.4	17.3	4.5	18.6	4.5
St_Charles_rest	2.1	1.9	16.0	2.1	16.0	4.2	11.5	1.9	17.3	2.1	18.6	4.2
STJO_10b	10.6	10.6	12.9	12.9	14.1	14.1	13.3	13.2	15.6	15.5	16.7	16.7
STJO_8c	9.4	4.1	12.2	4.5	14.0	7.8	12.7	4.1	15.4	4.5	17.2	7.8
STTA_10e	12.2	4.3	16.2	4.6	18.2	5.9	13.3	4.3	16.7	4.6	18.6	5.9
STTA_9a	10.4	10.4	12.7	12.7	14.0	14.0	13.2	13.0	15.6	15.3	17.5	16.6
TANG_10b	11.0	11.0	13.6	13.6	15.0	15.0	13.7	13.6	16.3	16.2	17.8	17.6
West_Lacombe_2	10.5	10.5	13.5	13.5	15.0	15.0	13.2	13.1	15.8	16.1	17.3	17.6
Evaluation Parameters	Confidence Level:			90%		Levee Design:			No Friction Waves			
	Future Relative Sea Level Rise:			2.6 feet		Levee Overtopping:			No Friction Waves			

1702

Planning Unit:	1	Alt. No.:	PU1-LP-a-100-1	Category:	Coastal Restoration + Structural Measures
Alternative Description:	Sustain coastal landscape through restoration and construct barrier-weir and levees to reduce risk to the Lake Pontchartrain area. Raise upper Plaquemines levees to 100-year level of risk reduction.				
Coastal Component:	R2 (pulsed diversions)			Nonstructural Component:	None
Structural Component:	See alternative description above.				

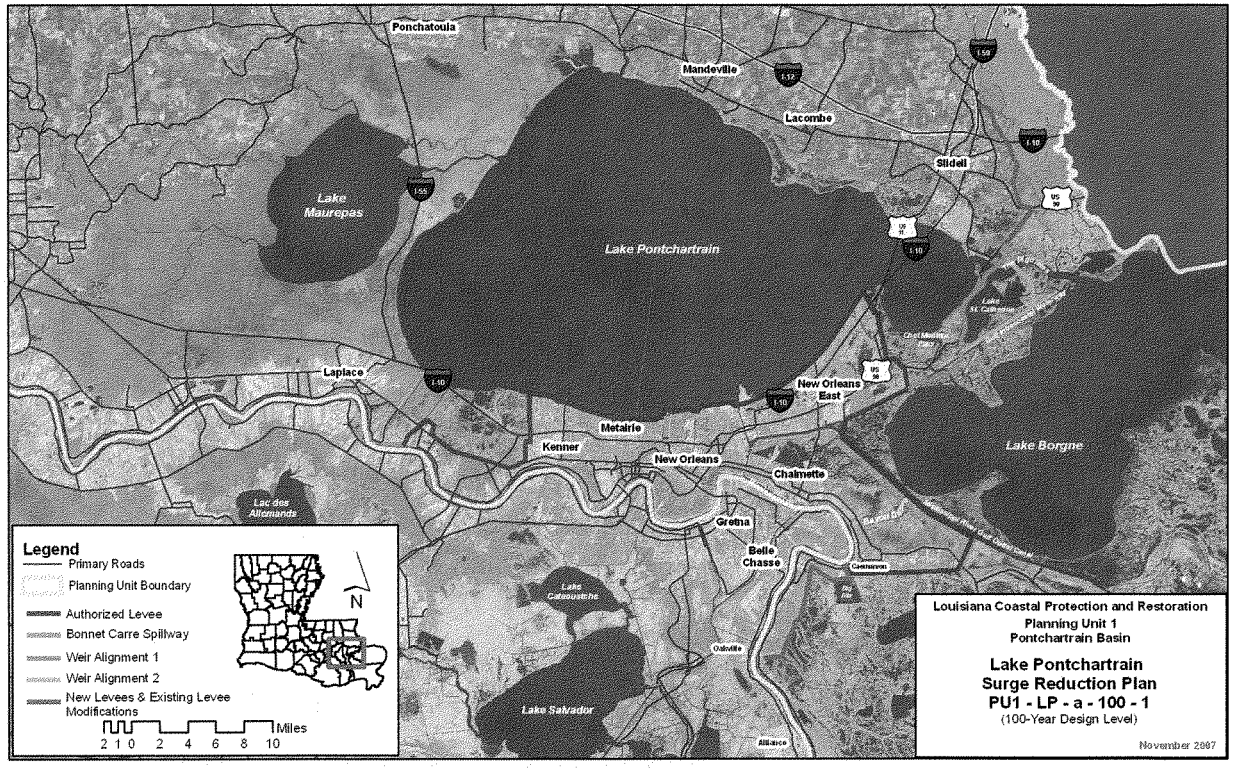
Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	903	32,794	354	221	1,285	61	325	140	51
		Mid		35,620	511	411	1,991	107	295	133	50
		Low		40,916	904	823	3,715	214	265	127	43
2	High RSLR High Employment Dispersed Population	High	921	33,978	391	312	1,537	85	325	136	51
		Mid		37,219	582	551	2,379	142	295	129	45
		Low		42,568	1,096	1,237	4,808	319	265	123	40
3	Low RSLR Business-as-Usual Compact Population	High	903	29,002	341	187	1,197	53	325	140	51
		Mid		31,669	487	328	1,840	90	295	133	50
		Low		36,632	849	627	3,335	172	265	127	43
4	High RSLR Business-as-Usual Compact Population	High	921	29,765	370	230	1,347	67	325	136	51
		Mid		32,824	542	397	2,072	111	295	129	45
		Low		37,791	991	962	4,173	255	265	123	40

Other Results			Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Construction Time (years)		14	After 50 yrs (% of baseline)	106	104	106	104
Direct Wetland Impacts (acres)		1,000	After 100 yrs (% of baseline)	104	95	104	95
Indirect Impacts (unitless)		-8	Present Value of Life Cycle Costs ($ Millions)				
Spatial Integrity (unitless)		0.42	Coastal Component	10,666	10,899	10,666	10,899
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)	Nonstructural Component	0	0	0	0
	1 / 2	6,255	Structural Component	7,024	7,132	7,024	7,132
	3 / 4	6,255	Total Project	17,690	18,031	17,690	18,031

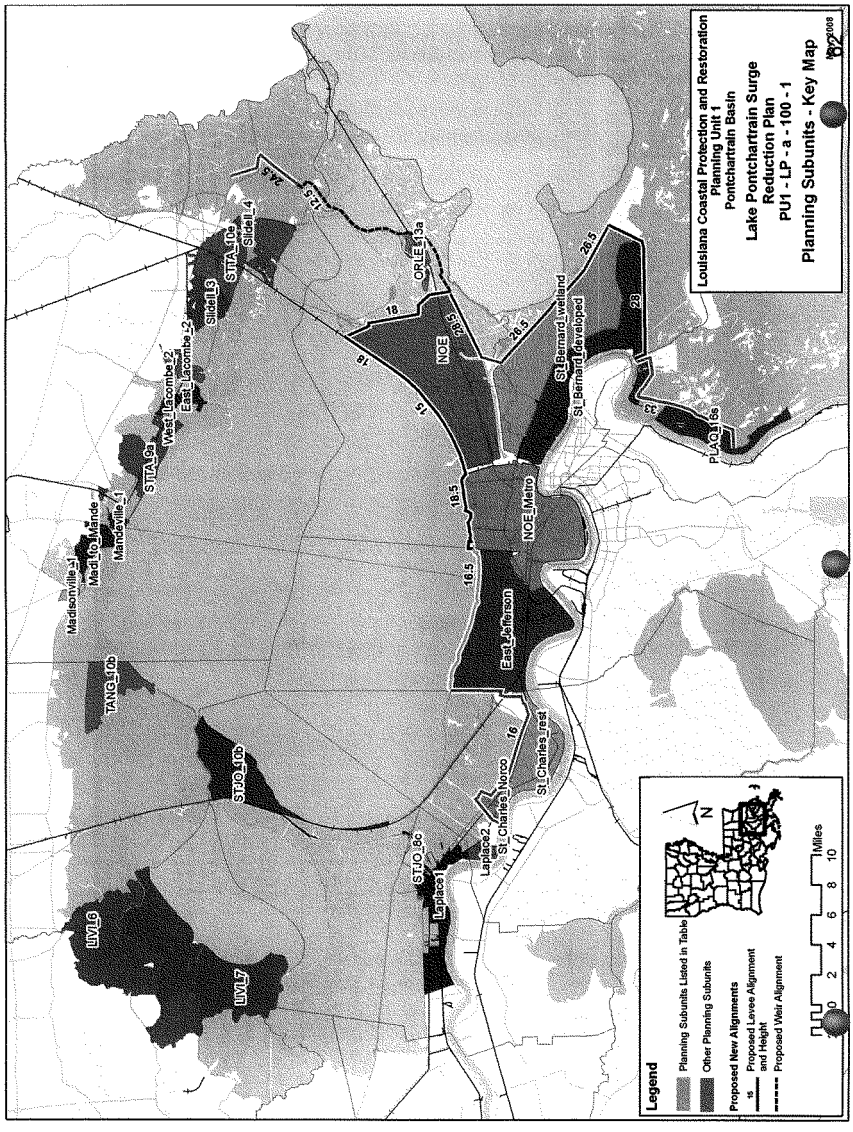
2075 Residual Risk / Damages - Low Uncertainty ($ Millions)								
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4	
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj
10-year	1,215	1,034	1,472	1,211	1,081	906	1,345	1,074
100-year	11,935	4,200	34,000	6,145	9,879	3,194	26,076	4,731
400-year	89,937	19,737	116,204	24,112	62,688	13,418	80,694	16,202
1,000-year	118,260	54,345	122,423	58,424	81,963	37,801	84,515	40,213
2,000-year	122,343	108,114	125,886	111,525	84,351	75,417	86,336	77,362

Planning Unit 1
Structural Plan
Lake Pontchartrain Surge Reduction Alt
100-year Design

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels.


Ponchatoula
Mandeville
Lacombe
Slidell
Lake Maurepas
Lake Pontchartrain
Laplace
New Orleans East
Metairie
Kenner
New Orleans
Chalmette
Lake Borgne
Lac des Allemands
Gretna
Belle Chasse
Lake Cataouatche
Lake Salvador
Legend
Primary Roads
Planning Unit Boundary
Authorized Levee
Bonnet Carre Spillway
Weir Alignment 1
Weir Alignment 2
New Levees & Existing Levee Modifications
Miles
2 1 0 2 4 6 8 10
N
Louisiana Coastal Protection and Restoration
Planning Unit 1
Pontchartrain Basin
Lake Pontchartrain
Surge Reduction Plan
PU1 - LP - a - 100 - 1
(100-Year Design Level)
November 2007

1704


Louisiana Coastal Protection and Restoration
Planning Unit 1
Pontchartrain Basin
Lake Pontchartrain Surge
Reduction Plan
PU1 - LP - a - 100 - 1
Planning Subunits - Key Map
Legend
Planning Subunits Listed in Table
Other Planning Subunits
Proposed New Alignments
Proposed Levee Alignment and Height
Proposed Weir Alignment
Miles
0 2 4 6 8 10
N
LIVL_6
LIVL_7
STJO_8c
Laplace1
Laplace2
St_Charles_Norco
St_Charles_rest
STJO_10b
TANG_10b
Madisonville_1
Madi_to_Mande
Mandeville_1
STTA_9a
West_Lacombe_2
East_Lacombe_2
Slidell_3
STTA_10c
Slidell_4
ORLE_13a
NOE
NOE_Metro
East_Jefferson
St_Bernard_wetland
St_Bernard_developed
PLAQ_16s
24.5
12.5
18
18
15
18.5
16.5
16
26.5
26.5
28
33

Alternative: PU1-LP-a-100-1

Water Surface Elevations (feet - NAVD88 2004.65)

Planning Sub Unit	2010 (Base) Conditions						2060 (Future) Conditions					
	100-yr Event		400-year Event		1,000-yr Event		100-yr Event		400-year Event		1,000-yr Event	
	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project
East_Jefferson	-5.1	-5.3	-1.3	-4.7	4.4	-2.1	-2.6	-5.3	16.0	-4.7	16.0	-2.1
East_Lacombe_2	10.9	7.2	14.3	11.1	15.9	13.2	17.3	9.8	21.7	13.7	23.6	15.8
Laplace1	9.4	6.1	12.2	10.5	14.0	13.6	12.4	8.7	15.0	13.1	16.8	16.2
Laplace2	8.5	9.4	11.0	11.9	12.8	13.4	11.2	12.0	14.3	14.5	16.2	16.0
LIVI_6	7.3	4.1	9.7	5.2	11.1	6.1	10.3	6.7	12.8	7.8	13.9	8.7
LIVI_7	7.5	5.5	9.7	6.9	10.9	7.8	11.0	8.1	13.1	9.5	14.4	10.4
Madi_to_Mande	11.0	11.5	13.1	12.5	14.3	13.3	13.8	14.1	16.7	15.1	18.3	15.9
Madisonville_1	11.7	10.1	14.6	14.9	16.1	27.3	13.5	12.7	15.8	17.5	16.9	29.9
Mandeville_1	11.0	11.5	13.1	12.5	14.3	13.3	14.9	14.1	19.1	15.1	21.4	15.9
NOE	-5.8	-5.9	0.5	-4.0	10.9	-0.2	-0.1	-5.9	16.0	-4.0	16.0	-0.2
NOE_Metro	-5.1	-5.2	-4.8	-5.1	-3.0	-5.1	-5.0	-5.2	16.0	-5.1	16.0	-5.1
ORLE_13a	14.6	16.4	17.8	21.8	19.4	26.5	17.9	19.0	21.5	24.4	23.8	29.1
PLAQ_16s	19.2	17.8	25.3	25.7	30.0	29.9	21.4	20.4	27.8	28.3	31.8	32.5
Slidell_3	11.5	8.5	15.1	12.8	16.8	14.9	13.4	11.1	16.8	15.4	18.5	17.5
Slidell_4	14.1	10.0	18.3	16.4	20.4	22.2	20.5	12.6	24.3	19.0	26.5	24.8
St_Bernard_developed	-0.1	-0.1	4.3	4.8	10.6	12.5	2.3	-0.1	16.0	4.8	16.0	12.5
St_Bernard_wetland	2.4	2.4	5.2	5.4	10.6	12.5	4.5	2.4	16.0	5.4	16.0	12.5
St_Charles_Norco	4.4	3.4	16.0	4.6	16.0	16.0	11.5	3.4	17.3	4.6	18.6	16.0
St_Charles_rest	2.1	1.9	16.0	4.6	16.0	16.0	11.5	1.9	17.3	4.6	18.6	16.0
STJO_10b	10.6	8.9	12.9	11.4	14.1	12.8	13.3	11.5	15.6	14.0	16.7	15.4
STJO_8c	9.4	6.1	12.2	10.5	14.0	13.6	12.7	8.7	15.4	13.1	17.2	16.2
STTA_10e	12.2	8.8	16.2	13.1	18.2	15.3	13.3	11.4	16.7	15.7	18.6	17.9
STTA_9a	10.4	8.0	12.7	9.4	14.0	10.4	13.2	10.6	15.6	12.0	17.5	13.0
TANG_10b	11.0	7.7	13.6	10.6	15.0	12.1	13.7	10.3	16.3	13.2	17.8	14.7
West_Lacombe_2	10.5	7.4	13.5	10.0	15.0	11.5	13.2	10.0	15.8	12.6	17.3	14.1

Evaluation Parameters				
	Confidence Level:	90%	Levee Design:	No Friction Waves
	Future Relative Sea Level Rise:	2.6 feet	Levee Overtopping:	No Friction Waves

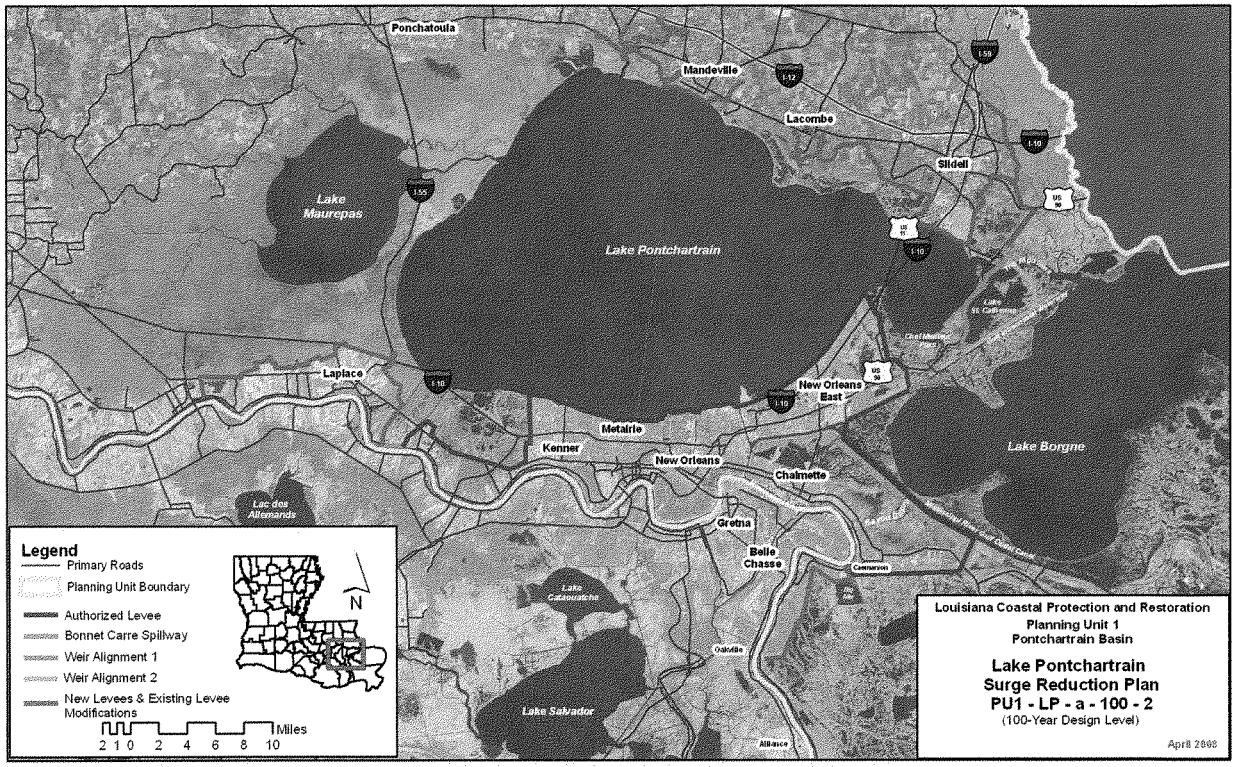
Planning Unit:	1	Alt. No.:	PU1-LP-a-100-2	Category:	Coastal Restoration + Structural Measures
Alternative Description:	Sustain coastal landscape through restoration and construct barrier-weir and levees to reduce risk to the Lake Pontchartrain area. Raise upper Plaquemines levees and construct new levees around Laplace and across the Northshore to the 100-year level of ri				
Coastal Component:	R2 (pulsed diversions)		Nonstructural Component:		None
Structural Component:	See alternative description above.				

Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	1,691	31,733	329	203	1,213	56	361	145	51
		Mid		34,111	474	376	1,839	97	331	137	50
		Low		38,655	842	745	3,435	193	301	134	43
2	High RSLR High Employment Dispersed Population	High	1,710	32,310	354	266	1,360	69	361	138	51
		Mid		35,036	525	467	2,097	120	331	135	49
		Low		39,833	999	1,102	4,432	288	301	129	41
3	Low RSLR Business-as-Usual Compact Population	High	1,691	28,104	316	171	1,128	48	361	145	51
		Mid		30,373	451	305	1,708	82	331	137	50
		Low		34,531	788	583	3,102	158	301	134	43
4	High RSLR Business-as-Usual Compact Population	High	1,710	28,401	334	200	1,224	57	361	138	51
		Mid		31,006	489	352	1,864	96	331	135	49
		Low		35,298	901	882	3,859	232	301	129	41

Other Results			Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Construction Time (years)		14	After 50 yrs (% of baseline)	106	104	106	104
Direct Wetland Impacts (acres)		4,100	After 100 yrs (% of baseline)	104	95	104	95
Indirect Impacts (unitless)		-8	Present Value of Life Cycle Costs ($ Millions)				
Spatial Integrity (unitless)		0.42	Coastal Component	10,666	10,899	10,666	10,899
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)	Nonstructural Component	0	0	0	0
	1 / 2	11,805	Structural Component	22,443	22,582	22,443	22,582
	3 / 4	11,805	Total Project	33,109	33,481	33,109	33,481

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 1 Structural Plan Lake Pontchartrain Surge Reduction Alt 100-year Design
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	
10-year	1,215	941	1,472	1,007	1,081	811	1,345	870	
100-year	11,935	2,536	34,000	2,851	9,879	1,678	26,076	1,816	
400-year	89,937	16,183	116,204	16,791	62,688	10,505	80,694	10,730	
1,000-year	118,260	50,576	122,423	51,287	81,963	34,816	84,515	35,037	
2,000-year	122,343	105,784	125,886	106,664	84,351	73,501	86,336	73,745	

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels.


Ponchatoula
Mandeville
Lacombe
Slidell
Lake Maurepas
Lake Pontchartrain
Laplace
New Orleans East
Metairie
Kenner
New Orleans
Chalmette
Lake Borgne
Lac des Allemands
Gretna
Belle Chasse
Lake Cataouatche
Lake Salvador
Legend
Primary Roads
Planning Unit Boundary
Authorized Levee
Bonnet Carre Spillway
Weir Alignment 1
Weir Alignment 2
New Levees & Existing Levee Modifications
Miles
2 1 0 2 4 6 8 10
N
Louisiana Coastal Protection and Restoration
Planning Unit 1
Pontchartrain Basin
Lake Pontchartrain
Surge Reduction Plan
PU1 - LP - a - 100 - 2
(100-Year Design Level)
April 2008

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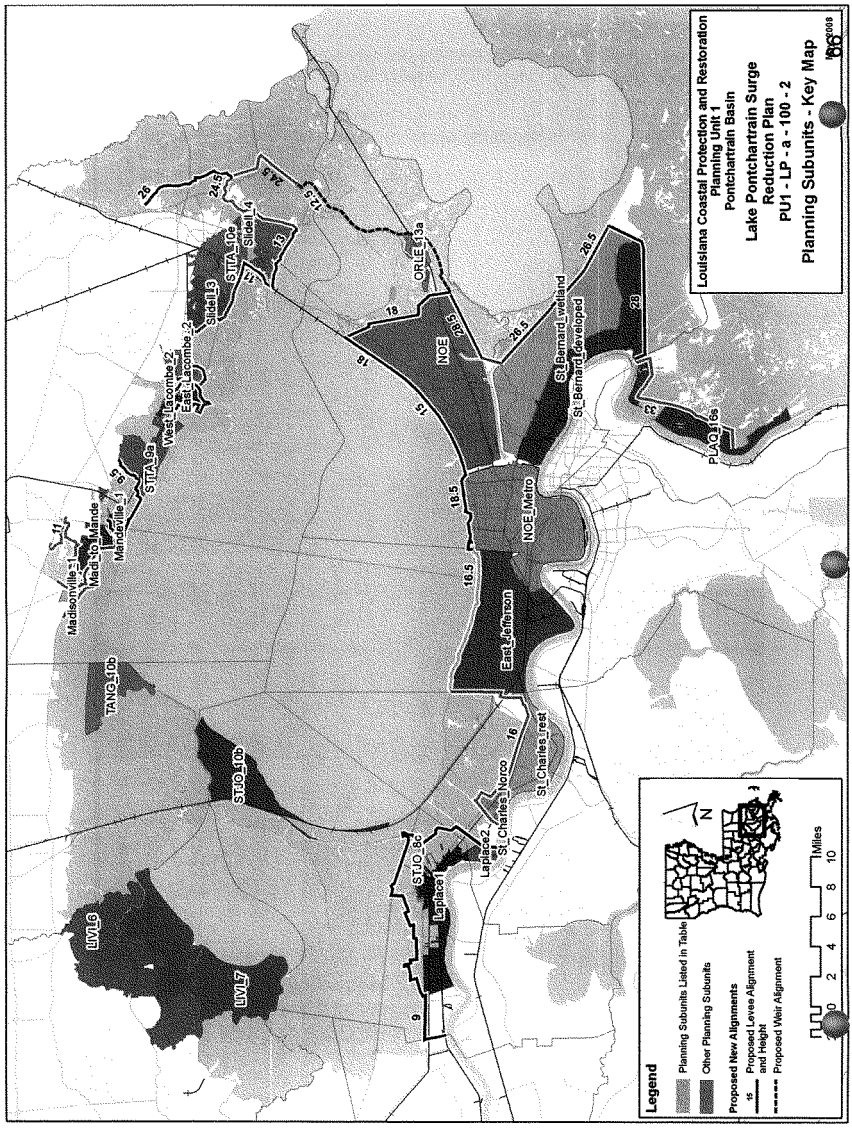
Louisiana Coastal Protection and Restoration
Planning Unit 1
Pontchartrain Basin
Lake Pontchartrain Surge
Reduction Plan
PU1 - LP - a - 100 - 2
Planning Subunits - Key Map
Legend
Planning Subunits Listed in Table
Other Planning Subunits
Proposed New Alignments
Proposed Levee Alignment and Height
Proposed Weir Alignment
Miles
N
LIVI_9
LIVI_7
TANG_10b
STJO_10b
STJO_9c
Lafitte_1
Lafitte_2
St_Charles_Norco
St_Charles_rest
East_Jefferson
NOE_Metro
NOE
ORLE_13a
St_Bernard_wetland
St_Bernard_developed
PLAQ_16s
Madisonville_1
Madisonville_2
Mandeville_1
STTA_9a
West_Lacombe_2
East_Lacombe_2
Slidell_1c
Slidell_1d
Slidell_1g

Alternative: PU1-LP-a-100-2

Water Surface Elevations (feet - NAVD88 2004.65)

Planning Sub Unit	2010 (Base) Conditions						2060 (Future) Conditions					
	100-yr Event		400-year Event		1,000-yr Event		100-yr Event		400-year Event		1,000-yr Event	
	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project
East_Jefferson	-5.1	-5.3	-1.3	-4.7	4.4	-2.1	-2.6	-5.3	16.0	-4.7	16.0	-2.1
East_Lacombe_2	10.9	4.9	14.3	9.6	15.9	11.5	17.3	4.9	21.7	9.6	23.6	11.5
Laplace1	9.4	4.6	12.2	9.0	14.0	10.9	12.4	4.6	15.0	9.0	16.8	10.9
Laplace2	8.5	4.6	11.0	9.0	12.8	10.9	11.2	4.6	14.3	9.0	16.2	10.9
LIVI_6	7.3	4.1	9.7	5.2	11.1	6.1	10.3	6.7	12.8	7.8	13.9	8.7
LIVI_7	7.5	5.5	9.7	6.9	10.9	7.8	11.0	8.1	13.1	9.5	14.4	10.4
Madi_to_Mande	11.0	5.9	13.1	11.0	14.3	11.1	13.8	5.9	16.7	11.0	18.3	11.1
Madisonville_1	11.7	6.4	14.6	11.0	16.1	11.1	13.5	6.4	15.8	11.0	16.9	11.1
Mandeville_1	11.0	6.7	13.1	9.5	14.3	10.1	14.9	6.7	19.1	9.5	21.4	10.1
NOE	-5.8	-5.9	0.5	-4.0	10.9	-0.2	-0.1	-5.9	16.0	-4.0	16.0	-0.2
NOE_Metro	-5.1	-5.2	-4.8	-5.1	-3.0	-5.1	-5.0	-5.2	16.0	-5.1	16.0	-5.1
ORLE_13a	14.6	16.4	17.8	21.8	19.4	26.5	17.9	19.0	21.5	24.4	23.8	29.1
PLAQ_16s	19.2	0.5	25.3	16.4	30.0	18.0	21.4	0.5	27.8	16.4	31.8	18.0
Slidell_3	11.5	4.5	15.1	13.9	16.8	16.4	13.4	4.5	16.8	13.9	18.5	16.4
Slidell_4	14.1	6.2	18.3	13.9	20.4	16.4	20.5	6.2	24.3	13.9	26.5	16.4
St_Bernard_developed	-0.1	-0.1	4.3	4.8	10.6	12.5	2.3	-0.1	16.0	4.8	16.0	12.5
St_Bernard_wetland	2.4	2.4	5.2	5.4	10.6	12.5	4.5	2.4	16.0	5.4	16.0	12.5
St_Charles_Norco	4.4	3.4	16.0	4.6	16.0	16.0	11.5	3.4	17.3	4.6	18.6	16.0
St_Charles_rest	2.1	1.9	16.0	4.6	16.0	16.0	11.5	1.9	17.3	4.6	18.6	16.0
STJO_10b	10.6	8.9	12.9	11.4	14.1	12.8	13.3	11.5	15.6	14.0	16.7	15.4
STJO_8c	9.4	4.6	12.2	9.0	14.0	10.9	12.7	4.6	15.4	9.0	17.2	10.9
STTA_10e	12.2	4.5	16.2	13.9	18.2	16.4	13.3	4.5	16.7	13.9	18.6	16.4
STTA_9a	10.4	8.0	12.7	9.4	14.0	10.4	13.2	10.6	15.6	12.0	17.5	13.0
TANG_10b	11.0	7.7	13.6	10.6	15.0	12.1	13.7	10.3	16.3	13.2	17.8	14.7
West_Lacombe_2	10.5	3.9	13.5	9.6	15.0	11.5	13.2	3.9	15.8	9.6	17.3	11.5

Evaluation Parameters						
	Confidence Level:	90%		Levee Design:	No Friction Waves	
	Future Relative Sea Level Rise:	2.6 feet		Levee Overtopping:	No Friction Waves	

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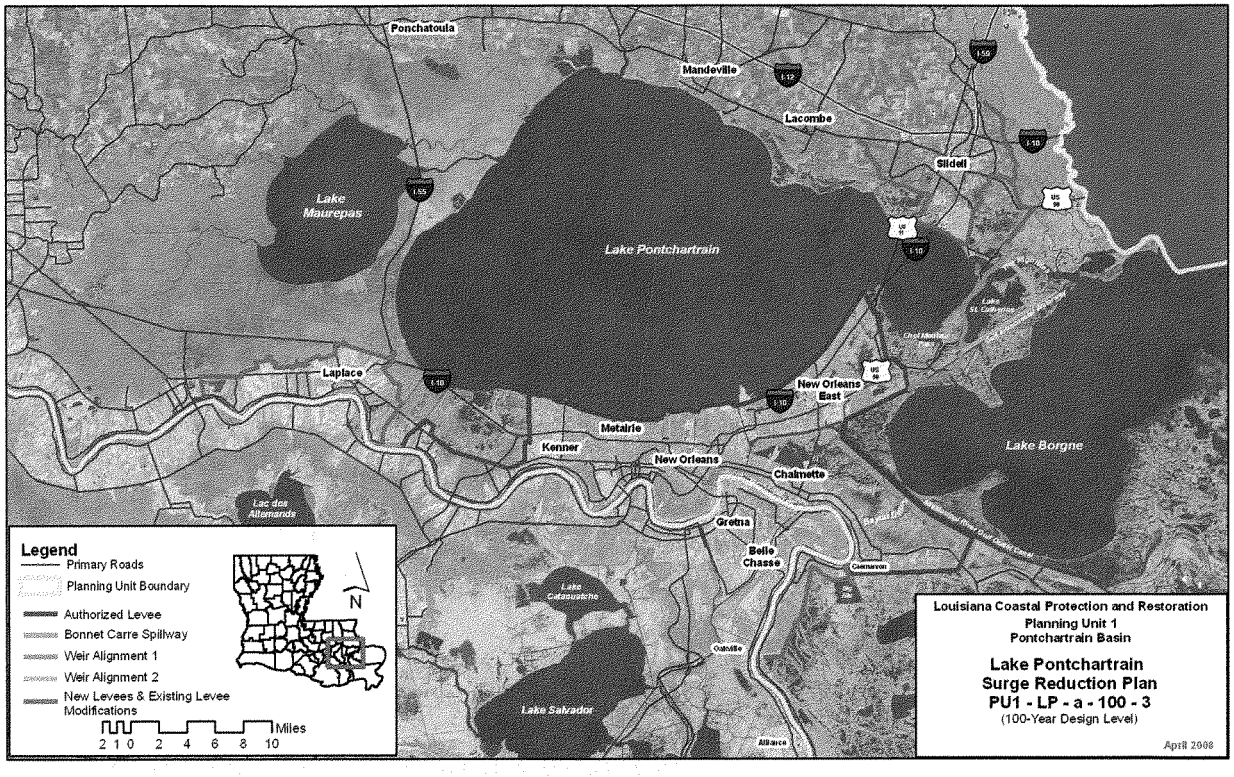
Planning Unit:	1	Alt. No.:	PU1-LP-a-100-3	Category:	Coastal Restoration + Structural Measures
Alternative Description:	Sustain coastal landscape through restoration and construct barrier-weir and levees to reduce risk to the Lake Pontchartrain area. Raise upper Plaquemines levees and construct new levees around Laplace and Slidell to the 100-year level of risk reduction.				
Coastal Component:	R2 (pulsed diversions)			Nonstructural Component:	None
Structural Component:	See alternative description above.				

Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	1,622	31,942	333	205	1,227	56	354	143	51
		Mid		34,379	479	380	1,856	98	324	133	50
		Low		38,931	850	753	3,467	196	294	127	43
2	High RSLR High Employment Dispersed Population	High	1,643	32,603	360	273	1,387	72	354	137	51
		Mid		35,378	535	477	2,133	122	324	128	45
		Low		40,198	1,012	1,119	4,485	293	294	123	40
3	Low RSLR Business-as-Usual Compact Population	High	1,622	28,214	321	173	1,136	48	354	143	51
		Mid		30,523	457	307	1,719	83	324	133	50
		Low		34,704	795	588	3,123	160	294	127	43
4	High RSLR Business-as-Usual Compact Population	High	1,643	28,552	340	204	1,242	58	354	137	51
		Mid		31,198	497	359	1,889	98	324	128	45
		Low		35,522	912	894	3,896	236	294	123	40

Other Results			Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Construction Time (years)		14	After 50 yrs (% of baseline)	106	104	106	104
Direct Wetland Impacts (acres)		3,700	After 100 yrs (% of baseline)	104	95	104	95
Indirect Impacts (unitless)		-8	Present Value of Life Cycle Costs ($ Millions)				
Spatial Integrity (unitless)		0.42	Coastal Component	10,666	10,899	10,666	10,899
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)	Nonstructural Component	0	0	0	0
	1 / 2	11,284 11,431	Structural Component	21,092	21,279	21,092	21,279
	3 / 4	11,284 11,431	Total Project	31,758	32,178	31,758	32,178

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 1 Structural Plan Lake Pontchartrain Surge Reduction Alt 100-year Design
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	
10-year	1,215	960	1,472	1,052	1,081	828	1,345	913	
100-year	11,935	2,742	34,000	3,299	9,879	1,853	26,076	2,159	
400-year	89,937	16,545	116,204	17,507	62,688	10,729	80,694	11,128	
1,000-year	118,260	51,238	122,423	52,430	81,963	35,144	84,515	35,612	
2,000-year	122,343	106,606	125,886	108,011	84,351	73,883	86,336	74,417	

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price level


Ponchatoula
Mandeville
Lacombe
Slidell
Lake Maurepas
Lake Pontchartrain
Laplace
New Orleans East
Metairie
Kenner
New Orleans
Chalmette
Lake Borgne
Lac des Allemands
Gretna
Belle Chasse
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Primary Roads
Planning Unit Boundary
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Bonnet Carre Spillway
Weir Alignment 1
Weir Alignment 2
New Levees & Existing Levee Modifications
Miles
2 1 0 2 4 6 8 10
N
Louisiana Coastal Protection and Restoration
Planning Unit 1
Pontchartrain Basin
Lake Pontchartrain
Surge Reduction Plan
PU1 - LP - a - 100 - 3
(100-Year Design Level)
April 2008

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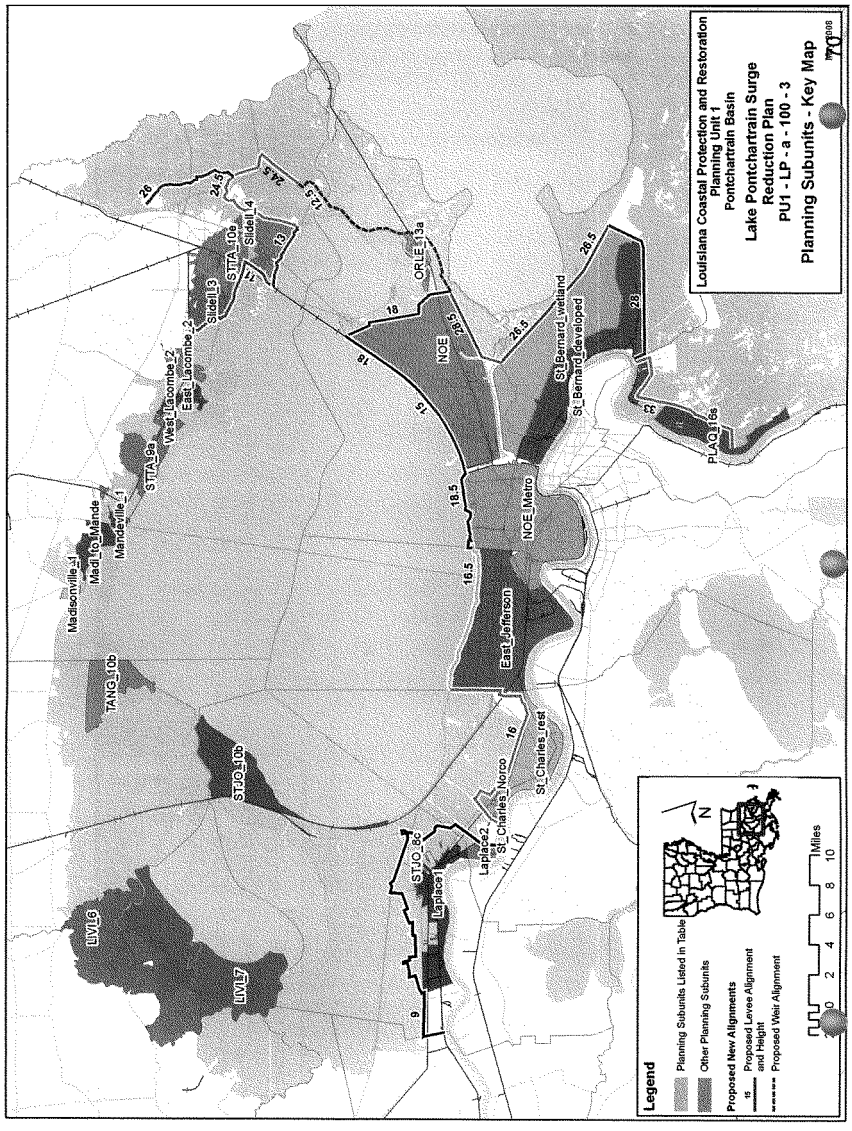

Louisiana Coastal Protection and Restoration
Planning Unit 1
Pontchartrain Basin
Lake Pontchartrain Surge
Reduction Plan
PU1 - LP - a - 100 - 3
Planning Subunits - Key Map
Legend
Planning Subunits Listed in Table
Other Planning Subunits
Proposed New Alignments
Proposed Levee Alignment and Height
Proposed Weir Alignment
Miles
LIVL6
LIVL7
STJO_10b
TANG_10b
Madisonville_1
Madi_to_Mande
Mandeville_1
STTA_9a
West_Lacombe_2
East_Lacombe_2
Slidell_3
STTA_10e
Slidell_4
ORLE_13a
NOE
NOE_Metro
East_Jefferson
St_Bernard_wetland
St_Bernard_developed
PLAQ_16s
St_Charles_rest
St_Charles_Norco
Laplace2
Laplace1
STJO_8c

Alternative: PU1-LP-a-100-3

Water Surface Elevations (feet - NAVD88 2004.65)

Planning Sub Unit	2010 (Base) Conditions						2060 (Future) Conditions					
	100-yr Event		400-year Event		1,000-yr Event		100-yr Event		400-year Event		1,000-yr Event	
	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project
East_Jefferson	-5.1	-5.3	-1.3	-4.7	4.4	-2.1	-2.6	-5.3	16.0	-4.7	16.0	-2.1
East_Lacombe_2	10.9	7.2	14.3	11.1	15.9	13.2	17.3	9.8	21.7	13.7	23.6	15.8
Laplace1	9.4	4.6	12.2	9.0	14.0	10.9	12.4	4.6	15.0	9.0	16.8	10.9
Laplace2	8.5	4.6	11.0	9.0	12.8	10.9	11.2	4.6	14.3	9.0	16.2	10.9
LIVI_6	7.3	4.1	9.7	5.2	11.1	6.1	10.3	6.7	12.8	7.8	13.9	8.7
LIVI_7	7.5	5.5	9.7	6.9	10.9	7.8	11.0	8.1	13.1	9.5	14.4	10.4
Madi_to_Mande	11.0	11.5	13.1	12.5	14.3	13.3	13.8	14.1	16.7	15.1	18.3	15.9
Madisonville_1	11.7	10.1	14.6	14.9	16.1	27.3	13.5	12.7	15.8	17.5	16.9	29.9
Mandeville_1	11.0	11.5	13.1	12.5	14.3	13.3	14.9	14.1	19.1	15.1	21.4	15.9
NOE	-5.8	-5.9	0.5	-4.0	10.9	-0.2	-0.1	-5.9	16.0	-4.0	16.0	-0.2
NOE_Metro	-5.1	-5.2	-4.8	-5.1	-3.0	-5.1	-5.0	-5.2	16.0	-5.1	16.0	-5.1
ORLE_13a	14.6	16.4	17.8	21.8	19.4	26.5	17.9	19.0	21.5	24.4	23.8	29.1
PLAQ_16s	19.2	0.5	25.3	16.4	30.0	18.0	21.4	0.5	27.8	16.4	31.8	18.0
Slidell_3	11.5	4.5	15.1	13.9	16.8	16.4	13.4	4.5	16.8	13.9	18.5	16.4
Slidell_4	14.1	6.2	18.3	13.9	20.4	16.4	20.5	6.2	24.3	13.9	26.5	16.4
St_Bernard_developed	-0.1	-0.1	4.3	4.8	10.6	12.5	2.3	-0.1	16.0	4.8	16.0	12.5
St_Bernard_wetland	2.4	2.4	5.2	5.4	10.6	12.5	4.5	2.4	16.0	5.4	16.0	12.5
St_Charles_Norco	4.4	3.4	16.0	4.6	16.0	16.0	11.5	3.4	17.3	4.6	18.6	16.0
St_Charles_rest	2.1	1.9	16.0	4.6	16.0	16.0	11.5	1.9	17.3	4.6	18.6	16.0
STJO_10b	10.6	8.9	12.9	11.4	14.1	12.8	13.3	11.5	15.6	14.0	16.7	15.4
STJO_8c	9.4	4.6	12.2	9.0	14.0	10.9	12.7	4.6	15.4	9.0	17.2	10.9
STTA_10e	12.2	4.5	16.2	13.9	18.2	16.4	13.3	4.5	16.7	13.9	18.6	16.4
STTA_9a	10.4	8.0	12.7	9.4	14.0	10.4	13.2	10.6	15.6	12.0	17.5	13.0
TANG_10b	11.0	7.7	13.6	10.6	15.0	12.1	13.7	10.3	16.3	13.2	17.8	14.7
West_Lacombe_2	10.5	7.4	13.5	10.0	15.0	11.5	13.2	10.0	15.8	12.6	17.3	14.1

Evaluation Parameters				
	Confidence Level:	90%	Levee Design:	No Friction Waves
	Future Relative Sea Level Rise:	2.6 feet	Levee Overtopping:	No Friction Waves

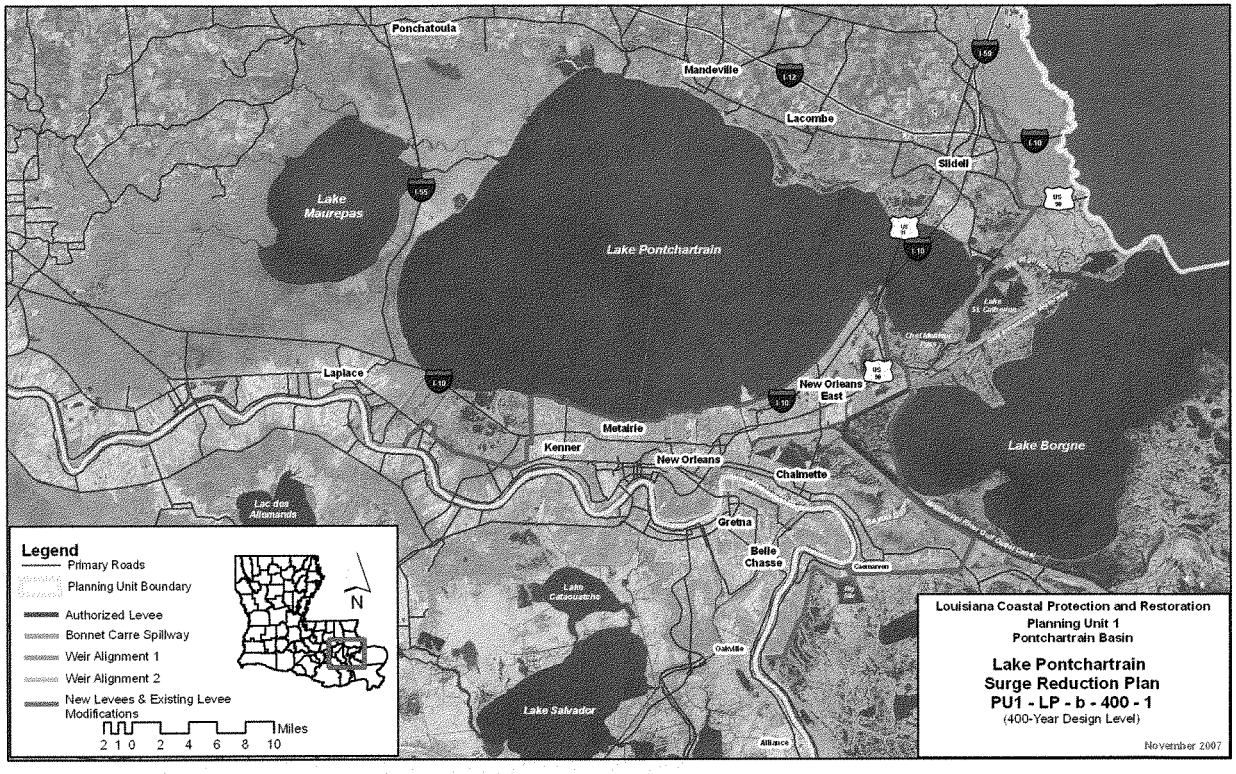
Planning Unit:	1	Alt. No.:	PU1-LP-b-400-1	Category:	Coastal Restoration + Structural Measures
Alternative Description:	Sustain coastal landscape through restoration and construct barrier-weir and levees to reduce risk to the Lake Pontchartrain area. Raise Lake Pontchartrain and Vicinity and upper Plaquemines levees to 400-year level of risk reduction.				
Coastal Component:	R2 (pulsed diversions)		Nonstructural Component:		None
Structural Component:	See alternative description above.				

Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	1,849	32,873	359	220	1,291	60	327	142	51
		Mid		35,618	517	420	2,021	109	297	137	50
		Low		40,570	878	797	3,598	207	267	131	48
2	High RSLR High Employment Dispersed Population	High	1,865	34,007	397	316	1,553	85	354	138	51
		Mid		37,263	594	572	2,443	148	324	133	50
		Low		42,333	1,096	1,273	4,869	330	294	129	45
3	Low RSLR Business-as-Usual Compact Population	High	1,849	29,237	348	190	1,217	53	327	142	51
		Mid		31,861	496	341	1,884	93	297	137	50
		Low		36,549	833	609	3,243	168	267	131	48
4	High RSLR Business-as-Usual Compact Population	High	1,865	29,968	378	237	1,379	69	354	138	51
		Mid		33,054	556	416	2,136	115	324	133	50
		Low		37,792	994	1,000	4,223	265	294	129	45

Other Results		Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Construction Time (years)	16	After 50 yrs (% of baseline)	106	104	106	104
Direct Wetland Impacts (acres)	4,200	After 100 yrs (% of baseline)	104	95	104	95
Indirect Impacts (unitless)	-8	Present Value of Life Cycle Costs ($ Millions)				
Spatial Integrity (unitless)	0.42	Coastal Component	10,666	10,899	10,666	10,899
Non-Federal Share of Present Value of Life Cycle Costs	Scenario / ($ Millions)	Nonstructural Component	0	0	0	0
	1 / 2: 12,754 / 12,865	Structural Component	25,538	25,620	25,538	25,620
	3 / 4: 12,754 / 12,865	Total Project	36,204	36,519	36,204	36,519

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 1 Structural Plan Lake Pontchartrain Surge Reduction Alt 400-year Design
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	
10-year	1,215	1,033	1,472	1,210	1,081	905	1,345	1,073	
100-year	11,935	4,144	34,000	6,088	9,879	3,146	26,076	4,684	
400-year	89,937	11,216	116,204	15,591	62,688	8,666	80,694	11,450	
1,000-year	118,260	20,434	122,423	24,513	81,963	14,819	84,515	17,231	
2,000-year	122,343	39,642	125,886	43,054	84,351	28,407	86,336	30,352	

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels.


Ponchatoula
Mandeville
Lacombe
Slidell
Lake Maurepas
Lake Pontchartrain
Laplace
New Orleans East
Metairie
Kenner
New Orleans
Chalmette
Lake Borgne
Lac des Allemands
Gretna
Belle Chasse
Lake Cataouatche
Lake Salvador
Galliville
Alliance
Legend
Primary Roads
Planning Unit Boundary
Authorized Levee
Bonnet Carre Spillway
Weir Alignment 1
Weir Alignment 2
New Levees & Existing Levee Modifications
Miles
2 1 0 2 4 6 8 10
N
Louisiana Coastal Protection and Restoration
Planning Unit 1
Pontchartrain Basin
Lake Pontchartrain
Surge Reduction Plan
PU1 - LP - b - 400 - 1
(400-Year Design Level)
November 2007

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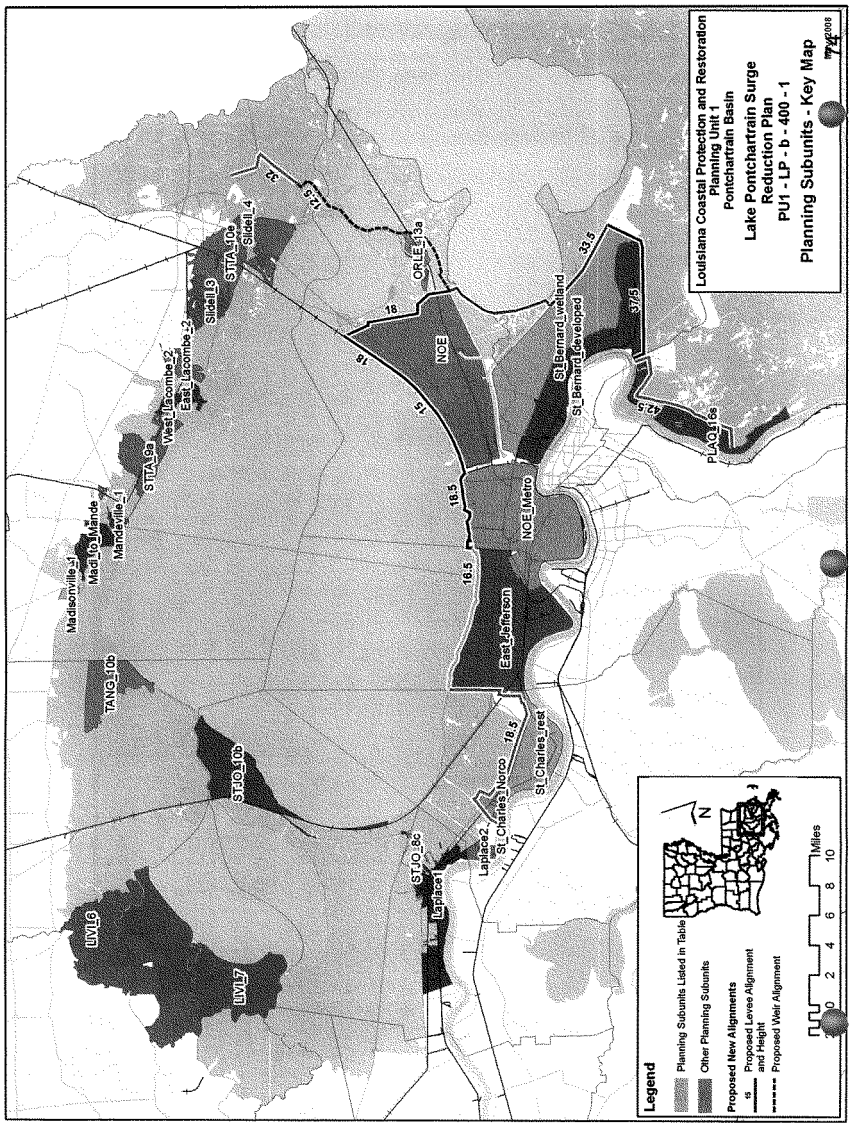

Louisiana Coastal Protection and Restoration
Planning Unit 1
Pontchartrain Basin
Lake Pontchartrain Surge
Reduction Plan
PU1 - LP - b - 400 - 1
Planning Subunits - Key Map
Legend
Planning Subunits Listed in Table
Other Planning Subunits
Proposed New Alignments
Proposed Levee Alignment and Height
Proposed Weir Alignment
Miles
0 2 4 6 8 10
N
LIVL6
LIVL7
STJO_8c
Laplace1
Laplace2
St_Charles_Norco
St_Charles_rest
STJO_10b
TANG_10b
Madisonville_1
Madi_to_Mande
Mandeville_1
STTA_9a
West_Lacombe_2
East_Lacombe_2
Slidell_3
STTA_10c
Slidell_4
ORLE_13a
NOE
NOE_Metro
East_Jefferson
St_Bernard_wetland
St_Bernard_developed
PLAQ_16s
32
12.5
18
18
15
18.5
16.5
18.5
33.5
37.5
42.5

Alternative: PU1-LP-b-400-1

Water Surface Elevations (feet - NAVD88 2004.65)

Planning Sub Unit	2010 (Base) Conditions						2060 (Future) Conditions					
	100-yr Event		400-year Event		1,000-yr Event		100-yr Event		400-year Event		1,000-yr Event	
	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project
East_Jefferson	-5.1	-5.3	-1.3	-5.1	4.4	-4.5	-2.6	-5.3	16.0	-5.1	16.0	-4.5
East_Lacombe_2	10.9	7.2	14.3	11.1	15.9	13.2	17.3	9.8	21.7	13.7	23.6	15.8
Laplace1	9.4	6.1	12.2	10.5	14.0	13.6	12.4	8.7	15.0	13.1	16.8	16.2
Laplace2	8.5	9.4	11.0	11.9	12.8	13.4	11.2	12.0	14.3	14.5	16.2	16.0
LIVI_6	7.3	4.1	9.7	5.2	11.1	6.1	10.3	6.7	12.8	7.8	13.9	8.7
LIVI_7	7.5	5.5	9.7	6.9	10.9	7.8	11.0	8.1	13.1	9.5	14.4	10.4
Madi_to_Mande	11.0	11.5	13.1	12.5	14.3	13.3	13.8	14.1	16.7	15.1	18.3	15.9
Madisonville_1	11.7	10.1	14.6	14.9	16.1	27.3	13.5	12.7	15.8	17.5	16.9	29.9
Mandeville_1	11.0	11.5	13.1	12.5	14.3	13.3	14.9	14.1	19.1	15.1	21.4	15.9
NOE	-5.8	-6.0	0.5	-5.9	10.9	-4.6	-0.1	-6.0	16.0	-5.9	16.0	-4.6
NOE_Metro	-5.1	-5.2	-4.8	-5.1	-3.0	-5.1	-5.0	-5.2	16.0	-5.1	16.0	-5.1
ORLE_13a	14.6	16.4	17.8	21.8	19.4	26.5	17.9	19.0	21.5	24.4	23.8	29.1
PLAQ_16s	19.2	17.8	25.3	25.7	30.0	29.9	21.4	20.4	27.8	28.3	31.8	32.5
Slidell_3	11.5	8.5	15.1	12.8	16.8	14.9	13.4	11.1	16.8	15.4	18.5	17.5
Slidell_4	14.1	10.0	18.3	16.4	20.4	22.2	20.5	12.6	24.3	19.0	26.5	24.8
St_Bernard_developed	-0.1	-0.4	4.3	-0.1	10.6	0.7	2.3	-0.4	16.0	-0.1	16.0	0.7
St_Bernard_wetland	2.4	1.7	5.2	1.8	10.6	2.2	4.5	1.7	16.0	1.8	16.0	2.2
St_Charles_Norco	4.4	3.4	16.0	4.2	16.0	4.5	11.5	3.4	17.3	4.2	18.6	4.5
St_Charles_rest	2.1	1.9	16.0	2.1	16.0	4.3	11.5	1.9	17.3	2.1	18.6	4.3
STJO_10b	10.6	8.9	12.9	11.4	14.1	12.8	13.3	11.5	15.6	14.0	16.7	15.4
STJO_8c	9.4	6.1	12.2	10.5	14.0	13.6	12.7	8.7	15.4	13.1	17.2	16.2
STTA_10e	12.2	8.8	16.2	13.1	18.2	15.3	13.3	11.4	16.7	15.7	18.6	17.9
STTA_9a	10.4	8.0	12.7	9.4	14.0	10.4	13.2	10.6	15.6	12.0	17.5	13.0
TANG_10b	11.0	7.7	13.6	10.6	15.0	12.1	13.7	10.3	16.3	13.2	17.8	14.7
West_Lacombe_2	10.5	7.4	13.5	10.0	15.0	11.5	13.2	10.0	15.8	12.6	17.3	14.1

Evaluation Parameters				
	Confidence Level:	90%	Levee Design:	No Friction Waves
	Future Relative Sea Level Rise:	2.6 feet	Levee Overtopping:	No Friction Waves

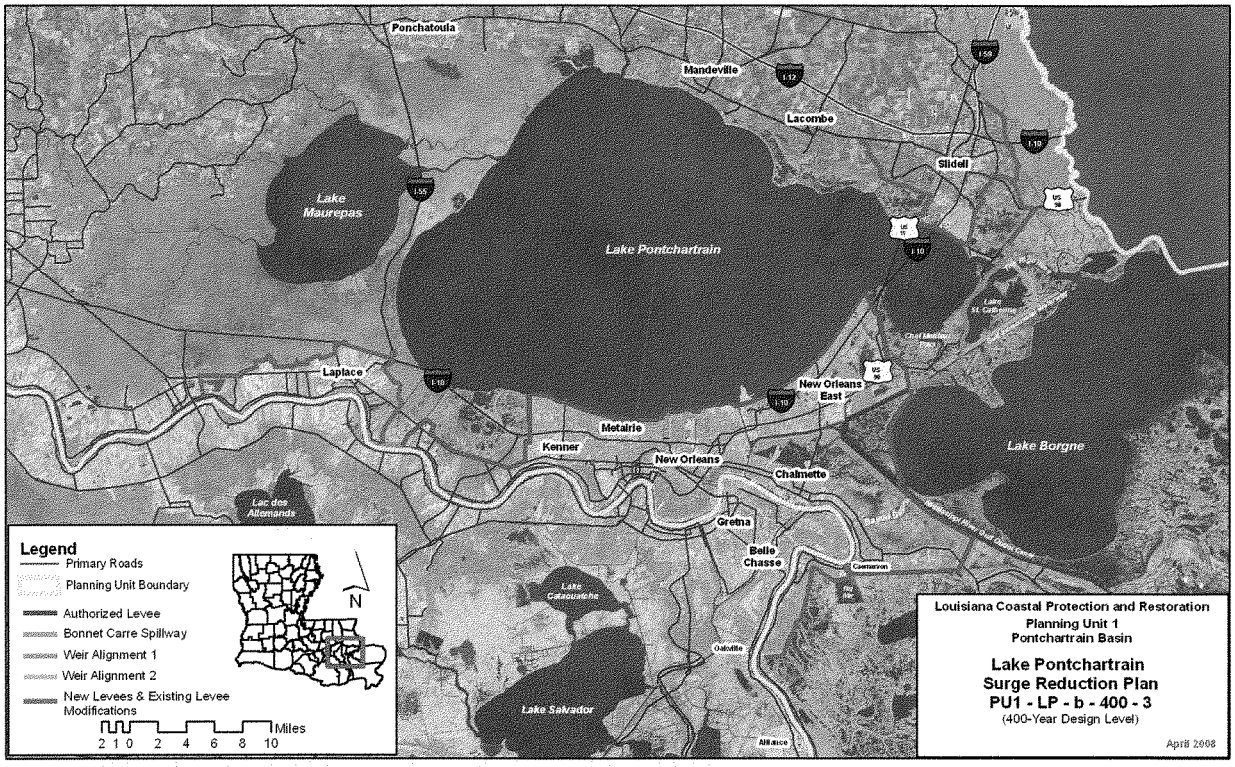
Planning Unit:	1	Alt. No.:	PU1-LP-b-400-3	Category:	Coastal Restoration + Structural Measures
Alternative Description:	Sustain coastal landscape through restoration and construct barrier-weir and levees to reduce risk to the Lake Pontchartrain area. Raise Lake Pontchartrain and Vicinity and upper Plaquemines levees and construct new levees around Laplace and Slidell to t				
Coastal Component:	R2 (pulsed diversions)			Nonstructural Component:	None
Structural Component:	See alternative description above.				

Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	2,847	32,087	339	205	1,235	56	356	149	51
		Mid		34,302	478	383	1,859	99	326	146	50
		Low		38,442	811	714	3,279	185	296	141	48
2	High RSLR High Employment Dispersed Population	High	2,867	32,762	368	280	1,417	73	356	147	51
		Mid		35,421	541	497	2,184	128	326	142	50
		Low		39,867	1,001	1,148	4,485	301	296	134	45
3	Low RSLR Business-as-Usual Compact Population	High	2,847	28,496	328	176	1,158	49	356	149	51
		Mid		30,580	458	311	1,724	83	326	146	50
		Low		34,419	766	554	2,943	150	296	141	48
4	High RSLR Business-as-Usual Compact Population	High	2,867	28,854	350	213	1,281	61	356	147	51
		Mid		31,353	504	371	1,922	101	326	142	50
		Low		35,364	903	918	3,865	241	296	134	45

Other Results			Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Construction Time (years)		16	After 50 yrs (% of baseline)	106	104	106	104
Direct Wetland Impacts (acres)		7,500	After 100 yrs (% of baseline)	104	95	104	95
Indirect Impacts (unitless)		-8	Present Value of Life Cycle Costs ($ Millions)				
Spatial Integrity (unitless)		0.42	Coastal Component	10,666	10,899	10,666	10,899
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)	Nonstructural Component	0	0	0	0
	1 / 2	19,733	Structural Component	45,081	45,238	45,081	45,238
	3 / 4	19,733	Total Project	55,747	56,137	55,747	56,137

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 1 Structural Plan Lake Pontchartrain Surge Reduction Alt 400-year Design
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	
10-year	1,215	959	1,472	1,051	1,081	827	1,345	912	
100-year	11,935	2,668	34,000	3,226	9,879	1,789	26,076	2,095	
400-year	89,937	4,448	116,204	5,411	62,688	2,452	80,694	2,851	
1,000-year	118,260	10,316	122,423	11,508	81,963	7,048	84,515	7,516	
2,000-year	122,343	29,258	125,886	30,663	84,351	21,861	86,336	22,395	

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels.


Ponchatoula
Mandeville
Lacombe
Slidell
Lake Maurepas
Lake Pontchartrain
Laplace
New Orleans East
Metairie
Kenner
New Orleans
Chalmette
Lake Borgne
Lac des Allemands
Gretna
Belle Chasse
Lake Cataouatche
Lake Salvador
Oakville
Alliance
Legend
Primary Roads
Planning Unit Boundary
Authorized Levee
Bonnet Carre Spillway
Weir Alignment 1
Weir Alignment 2
New Levees & Existing Levee Modifications
Miles
2 1 0 2 4 6 8 10
N
Louisiana Coastal Protection and Restoration
Planning Unit 1
Pontchartrain Basin
Lake Pontchartrain
Surge Reduction Plan
PU1 - LP - b - 400 - 3
(400-Year Design Level)
April 2008

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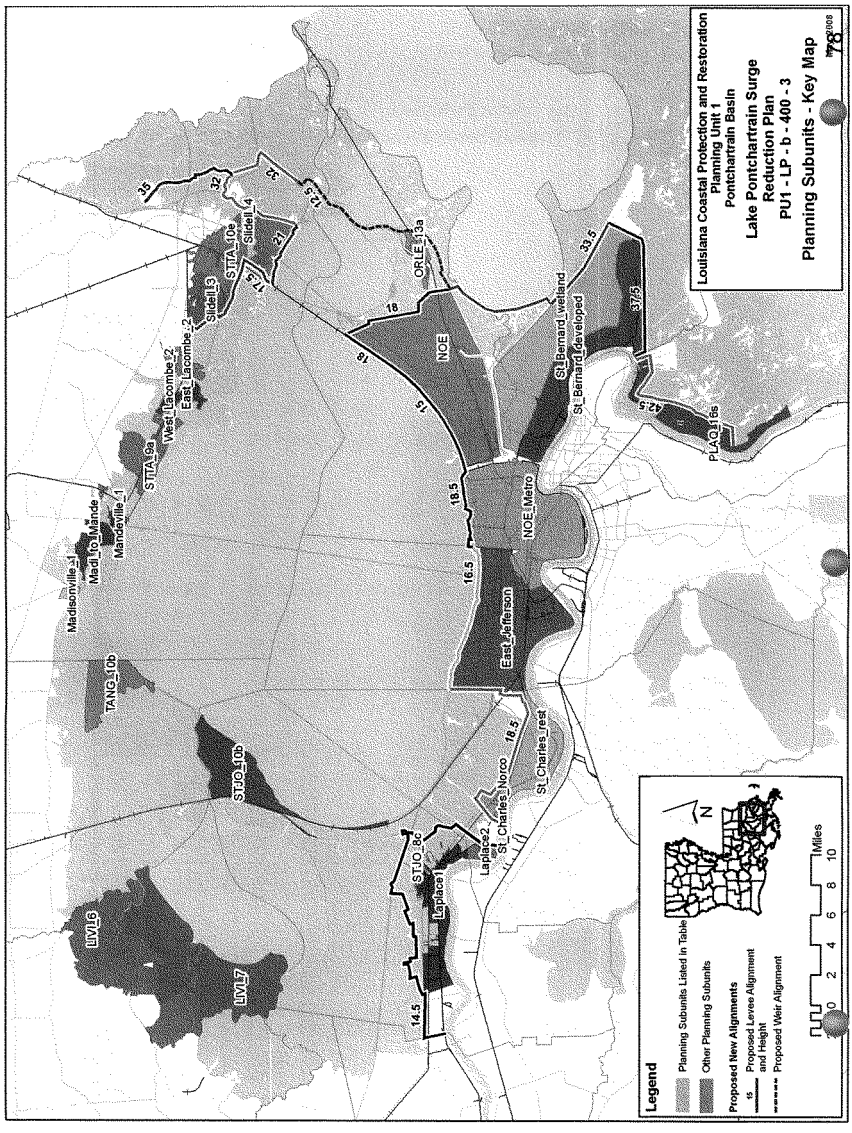

Louisiana Coastal Protection and Restoration
Planning Unit 1
Pontchartrain Basin
Lake Pontchartrain Surge
Reduction Plan
PU1 - LP - b - 400 - 3
Planning Subunits - Key Map
Legend
Planning Subunits Listed in Table
Other Planning Subunits
Proposed New Alignments
Proposed Levee Alignment and Height
Proposed Weir Alignment
Miles
0 2 4 6 8 10
N
LIVL6
LIVL7
STJO_10b
TANG_10b
Madisonville_1
Madi_to_Mande
Mandeville_1
STTA_9a
West_Lacombe_2
East_Lacombe_2
Slidell_3
Slidell_4
STTA_10e
ORLE_13a
NOE
NOE_Metro
East_Jefferson
St_Bernard_wetland
St_Bernard_developed
PLAQ_16s
St_Charles_rest
St_Charles_Norco
Laplace2
Laplace1
STJO_8c
14.5
16.5
18.5
15
18
17.5
21
32
35
33.5
37.5
42.5

Alternative: PU1-LP-b-400-3

Water Surface Elevations (feet - NAVD88 2004.65)

Planning Sub Unit	2010 (Base) Conditions						2060 (Future) Conditions					
	100-yr Event		400-year Event		1,000-yr Event		100-yr Event		400-year Event		1,000-yr Event	
	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project
East_Jefferson	-5.1	-5.3	-1.3	-5.1	4.4	-4.5	-2.6	-5.3	16.0	-5.1	16.0	-4.5
East_Lacombe_2	10.9	7.2	14.3	11.1	15.9	13.2	17.3	9.8	21.7	13.7	23.6	15.8
Laplace1	9.4	4.1	12.2	4.5	14.0	9.8	12.4	4.1	15.0	4.5	16.8	9.8
Laplace2	8.5	4.1	11.0	4.5	12.8	9.8	11.2	4.1	14.3	4.5	16.2	9.8
LIVI_6	7.3	4.1	9.7	5.2	11.1	6.1	10.3	6.7	12.8	7.8	13.9	8.7
LIVI_7	7.5	5.5	9.7	6.9	10.9	7.8	11.0	8.1	13.1	9.5	14.4	10.4
Madi_to_Mande	11.0	11.5	13.1	12.5	14.3	13.3	13.8	14.1	16.7	15.1	18.3	15.9
Madisonville_1	11.7	10.1	14.6	14.9	16.1	27.3	13.5	12.7	15.8	17.5	16.9	29.9
Mandeville_1	11.0	11.5	13.1	12.5	14.3	13.3	14.9	14.1	19.1	15.1	21.4	15.9
NOE	-5.8	-6.0	0.5	-5.9	10.9	-4.6	-0.1	-6.0	16.0	-5.9	16.0	-4.6
NOE_Metro	-5.1	-5.2	-4.8	-5.1	-3.0	-5.1	-5.0	-5.2	16.0	-5.1	16.0	-5.1
ORLE_13a	14.6	16.4	17.8	21.8	19.4	26.5	17.9	19.0	21.5	24.4	23.8	29.1
PLAQ_16s	19.2	-0.1	25.3	0.9	30.0	4.0	21.4	-0.1	27.8	0.9	31.8	4.0
Slidell_3	11.5	4.3	15.1	4.5	16.8	6.4	13.4	4.3	16.8	4.5	18.5	6.4
Slidell_4	14.1	6.2	18.3	6.2	20.4	6.2	20.5	6.2	24.3	6.2	26.5	6.2
St_Bernard_developed	-0.1	-0.4	4.3	-0.1	10.6	0.7	2.3	-0.4	16.0	-0.1	16.0	0.7
St_Bernard_wetland	2.4	1.7	5.2	1.8	10.6	2.2	4.5	1.7	16.0	1.8	16.0	2.2
St_Charles_Norco	4.4	3.4	16.0	4.2	16.0	4.5	11.5	3.4	17.3	4.2	18.6	4.5
St_Charles_rest	2.1	1.9	16.0	2.1	16.0	4.3	11.5	1.9	17.3	2.1	18.6	4.3
STJO_10b	10.6	8.9	12.9	11.4	14.1	12.8	13.3	11.5	15.6	14.0	16.7	15.4
STJO_8c	9.4	4.1	12.2	4.5	14.0	9.8	12.7	4.1	15.4	4.5	17.2	9.8
STTA_10e	12.2	4.3	16.2	4.5	18.2	6.4	13.3	4.3	16.7	4.5	18.6	6.4
STTA_9a	10.4	8.0	12.7	9.4	14.0	10.4	13.2	10.6	15.6	12.0	17.5	13.0
TANG_10b	11.0	7.7	13.6	10.6	15.0	12.1	13.7	10.3	16.3	13.2	17.8	14.7
West_Lacombe_2	10.5	7.4	13.5	10.0	15.0	11.5	13.2	10.0	15.8	12.6	17.3	14.1
Evaluation Parameters	Confidence Level:			90%		Levee Design:			No Friction Waves			
	Future Relative Sea Level Rise:			2.6 feet		Levee Overtopping:			No Friction Waves			

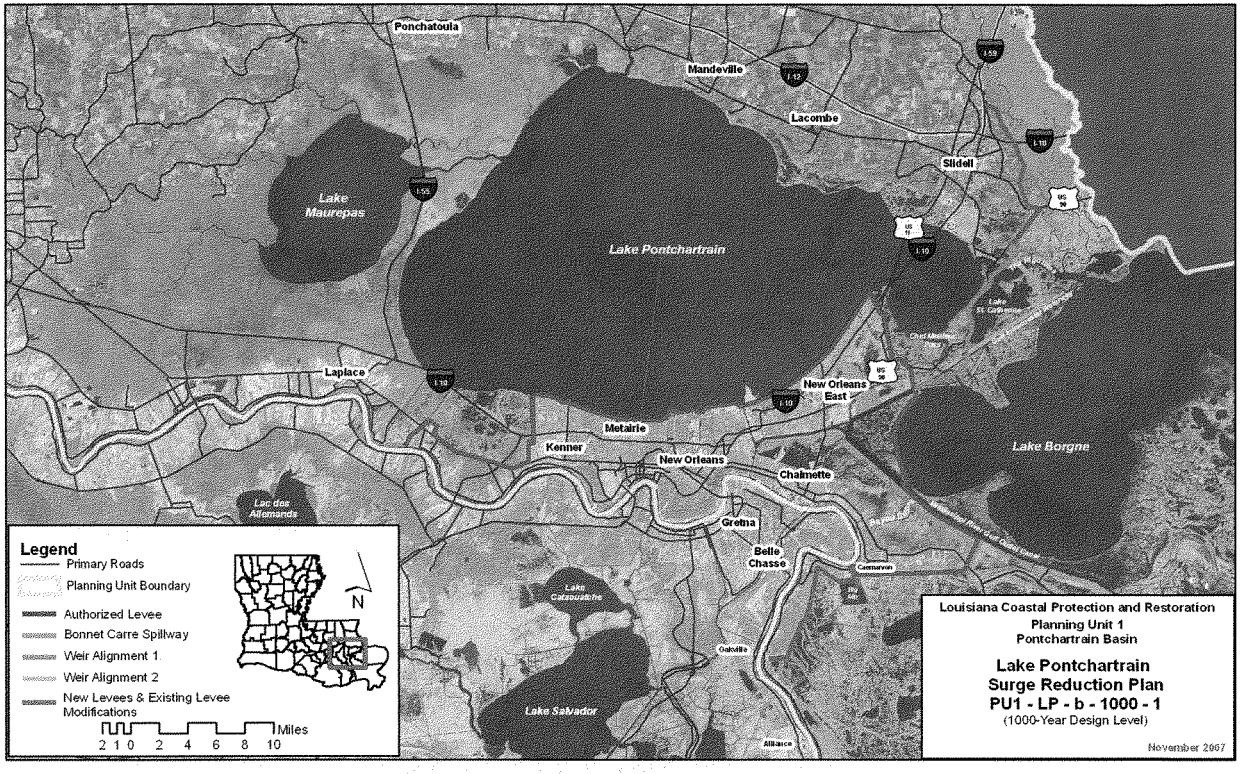
Planning Unit:	1	Alt. No.:	PU1-LP-b-1000-1	Category:	Coastal Restoration + Structural Measures
Alternative Description:	Sustain coastal landscape through restoration and construct barrier-weir and levees to reduce risk to the Lake Pontchartrain area. Raise Lake Pontchartrain and Vicinity and upper Plaquemines levees to 1000-year level of risk reduction.				
Coastal Component:	R2 (pulsed diversions)		Nonstructural Component:		None
Structural Component:	See alternative description above.				

Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	2,247	32,873	359	220	1,291	60	327	142	51
		Mid		35,605	517	420	2,021	109	297	137	50
		Low		40,423	874	789	3,561	205	267	131	48
2	High RSLR High Employment Dispersed Population	High	2,270	34,007	397	316	1,553	85	327	138	51
		Mid		37,249	594	372	2,443	147	297	133	50
		Low		42,186	1,091	1,264	4,832	327	267	129	45
3	Low RSLR Business-as-Usual Compact Population	High	2,247	29,237	348	190	1,217	53	327	142	51
		Mid		31,850	496	341	1,884	93	297	137	50
		Low		36,414	829	602	3,214	166	267	131	48
4	High RSLR Business-as-Usual Compact Population	High	2,270	29,968	378	237	1,379	69	327	138	51
		Mid		33,043	556	416	2,136	115	297	133	50
		Low		37,657	989	993	4,193	263	267	129	45

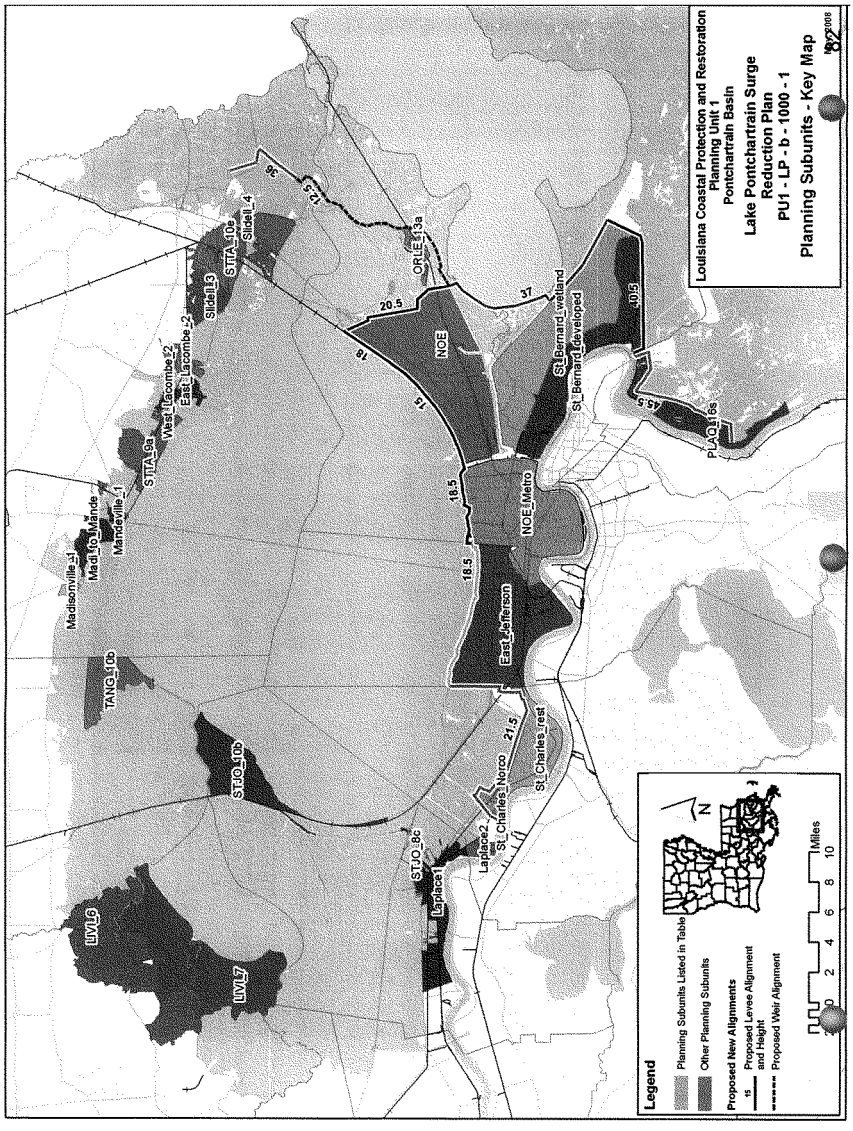
Other Results			Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Construction Time (years)		16	After 50 yrs (% of baseline)	106	104	106	104
Direct Wetland Impacts (acres)		5,100	After 100 yrs (% of baseline)	104	95	104	95
Indirect Impacts (unitless)		-8	Present Value of Life Cycle Costs ($ Millions)				
Spatial Integrity (unitless)		0.42	Coastal Component	10,666	10,899	10,666	10,899
Non-Federal Share of Present Value of Life Cycle Costs	Scenario ($ Millions)		Nonstructural Component	0	0	0	0
	1 / 2	15,628 15,788	Structural Component	33,339	33,562	33,339	33,562
	3 / 4	15,628 15,788	Total Project	44,005	44,461	44,005	44,461

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 1 Structural Plan Lake Pontchartrain Surge Reduction Alt 1000-year Design
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	
10-year	1,215	1,033	1,472	1,210	1,081	1,210	1,345	1,073	
100-year	11,935	4,142	34,000	6,087	9,879	6,087	26,076	4,683	
400-year	89,937	11,126	116,204	15,501	62,688	15,501	80,694	11,368	
1,000-year	118,260	18,304	122,423	22,384	81,963	22,384	84,515	15,520	
2,000-year	122,343	23,524	125,886	26,936	84,351	26,936	86,336	18,675	

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels.


Ponchatoula
Mandeville
Lacombe
Slidell
Lake Maurepas
Lake Pontchartrain
Laplace
New Orleans East
Metairie
Kenner
New Orleans
Chalmette
Lake Borgne
Lac des Allemands
Gretna
Belle Chasse
Lake Catapuatche
Lake Salvador
Legend
Primary Roads
Planning Unit Boundary
Authorized Levee
Bonnet Carre Spillway
Weir Alignment 1
Weir Alignment 2
New Levees & Existing Levee Modifications
Miles
2 1 0 2 4 6 8 10
N
Louisiana Coastal Protection and Restoration
Planning Unit 1
Pontchartrain Basin
Lake Pontchartrain
Surge Reduction Plan
PU1 - LP - b - 1000 - 1
(1000-Year Design Level)
November 2007

1724


Louisiana Coastal Protection and Restoration
Planning Unit 1
Pontchartrain Basin
Lake Pontchartrain Surge
Reduction Plan
PU1 - LP - b - 1000 - 1
Planning Subunits - Key Map
Legend
Planning Subunits Listed in Table
Other Planning Subunits
Proposed New Alignments
Proposed Levee Alignment and Height
Proposed Weir Alignment
Miles
0 2 4 6 8 10
N
LIVL6
LIVL7
STJO_8c
Laplace1
Laplace2
STJO_10b
TANG_10b
Madisonville_1
Madi_to_Mande
Mandeville_1
STTA_9a
West_Lacombe_2
East_Lacombe_2
Slidell_3
STTA_10e
Slidell_4
ORLE_13a
NOE
NOE_Metro
East_Jefferson
St_Charles_Norco
St_Charles_rest
St_Bernard_wetland
St_Bernard_developed
PLAQ_16s
36
12.5
20.5
37
18
15
18.5
18.5
21.5
40.5
45.5

Alternative: PU1-LP-b-1000-1

Water Surface Elevations (feet - NAVD88 2004.65)

Planning Sub Unit	2010 (Base) Conditions						2060 (Future) Conditions					
	100-yr Event		400-year Event		1,000-yr Event		100-yr Event		400-year Event		1,000-yr Event	
	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project
East_Jefferson	-5.1	-5.3	-1.3	-5.2	4.4	-5.0	-2.6	-5.3	16.0	-5.2	16.0	-5.0
East_Lacombe_2	10.9	7.2	14.3	11.1	15.9	13.2	17.3	9.8	21.7	13.7	23.6	15.8
Laplace1	9.4	6.1	12.2	10.5	14.0	13.6	12.4	8.7	15.0	13.1	16.8	16.2
Laplace2	8.5	9.4	11.0	11.9	12.8	13.4	11.2	12.0	14.3	14.5	16.2	16.0
LIVI_6	7.3	4.1	9.7	5.2	11.1	6.1	10.3	6.7	12.8	7.8	13.9	8.7
LIVI_7	7.5	5.5	9.7	6.9	10.9	7.8	11.0	8.1	13.1	9.5	14.4	10.4
Madi_to_Mande	11.0	11.5	13.1	12.5	14.3	13.3	13.8	14.1	16.7	15.1	18.3	15.9
Madisonville_1	11.7	10.1	14.6	14.9	16.1	27.3	13.5	12.7	15.8	17.5	16.9	29.9
Mandeville_1	11.0	11.5	13.1	12.5	14.3	13.3	14.9	14.1	19.1	15.1	21.4	15.9
NOE	-5.8	-6.0	0.5	-6.0	10.9	-5.9	-0.1	-6.0	16.0	-6.0	16.0	-5.9
NOE_Metro	-5.1	-5.2	-4.8	-5.1	-3.0	-5.1	-5.0	-5.2	16.0	-5.1	16.0	-5.1
ORLE_13a	14.6	16.4	17.8	21.8	19.4	26.5	17.9	19.0	21.5	24.4	23.8	29.1
PLAQ_16s	19.2	17.8	25.3	25.7	30.0	29.9	21.4	20.4	27.8	28.3	31.8	32.5
Slidell_3	11.5	8.5	15.1	12.8	16.8	14.9	13.4	11.1	16.8	15.4	18.5	17.5
Slidell_4	14.1	10.0	18.3	16.4	20.4	22.2	20.5	12.6	24.3	19.0	26.5	24.8
St_Bernard_developed	-0.1	-0.4	4.3	-0.3	10.6	0.1	2.3	-0.4	16.0	-0.3	16.0	0.1
St_Bernard_wetland	2.4	1.7	5.2	1.7	10.6	1.8	4.5	1.7	16.0	1.7	16.0	1.8
St_Charles_Norco	4.4	3.4	16.0	3.5	16.0	4.5	11.5	3.4	17.3	3.5	18.6	4.5
St_Charles_rest	2.1	1.9	16.0	1.9	16.0	2.1	11.5	1.9	17.3	1.9	18.6	2.1
STJO_10b	10.6	8.9	12.9	11.4	14.1	12.8	13.3	11.5	15.6	14.0	16.7	15.4
STJO_8c	9.4	6.1	12.2	10.5	14.0	13.6	12.7	8.7	15.4	13.1	17.2	16.2
STTA_10e	12.2	8.8	16.2	13.1	18.2	15.3	13.3	11.4	16.7	15.7	18.6	17.9
STTA_9a	10.4	8.0	12.7	9.4	14.0	10.4	13.2	10.6	15.6	12.0	17.5	13.0
TANG_10b	11.0	7.7	13.6	10.6	15.0	12.1	13.7	10.3	16.3	13.2	17.8	14.7
West_Lacombe_2	10.5	7.4	13.5	10.0	15.0	11.5	13.2	10.0	15.8	12.6	17.3	14.1
Evaluation Parameters	Confidence Level:			90%		Levee Design:			No Friction Waves			
	Future Relative Sea Level Rise:			2.6 feet		Levee Overtopping:			No Friction Waves			

Planning Unit:	1	Alt. No.:	PU1-LP-b-1000-2	Category:	Coastal Restoration + Structural Measures
Alternative Description:	Sustain coastal landscape through restoration and construct barrier-weir and levees to reduce risk to the Lake Pontchartrain area. Raise Lake Pontchartrain and Vicinity and upper Plaquemines levees and construct new levees around Laplace and across the No				
Coastal Component:	R2 (pulsed diversions)			Nonstructural Component:	None
Structural Component:	See alternative description above.				

Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	3,578	31,899	335	202	1,223	55	363	159	52
		Mid		34,031	473	379	1,843	98	333	159	50
		Low		37,940	796	696	3,203	180	303	156	48
2	High RSLR High Employment Dispersed Population	High	3,600	32,500	363	274	1,393	71	363	138	51
		Mid		35,084	532	488	2,152	125	333	135	49
		Low		39,287	981	1,122	4,390	293	303	129	41
3	Low RSLR Business-as-Usual Compact Population	High	3,578	28,396	325	175	1,151	49	363	159	52
		Mid		30,418	452	309	1,713	83	333	159	50
		Low		34,039	751	540	2,881	146	303	156	48
4	High RSLR Business-as-Usual Compact Population	High	3,600	28,718	345	209	1,265	59	363	138	51
		Mid		31,154	497	365	1,899	99	333	135	49
		Low		34,940	885	898	3,789	235	303	129	41

Other Results	
Construction Time (years)	16
Direct Wetland Impacts (acres)	9,100
Indirect Impacts (unitless)	-8
Spatial Integrity (unitless)	0.42

Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)	
	1 / 2	24,889	25,043
	3 / 4	24,889	25,043

Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
After 50 yrs (% of baseline)	106	104	106	104
After 100 yrs (% of baseline)	104	95	104	95
Present Value of Life Cycle Costs ($ Millions)				
Coastal Component	10,666	10,899	10,666	10,899
Nonstructural Component	0	0	0	0
Structural Component	59,398	59,605	59,398	59,605
Total Project	70,064	70,504	70,064	70,504

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 1 Structural Plan Lake Pontchartrain Surge Reduction Alt 1000-year Design
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	
10-year	1,215	939	1,472	1,006	1,081	810	1,345	869	
100-year	11,935	2,451	34,000	2,766	9,879	1,601	26,076	1,740	
400-year	89,937	3,853	116,204	4,462	62,688	1,999	80,694	2,223	
1,000-year	118,260	5,330	122,423	6,040	81,963	2,505	84,515	2,726	
2,000-year	122,343	7,208	125,886	8,088	84,351	3,853	86,336	4,096	

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels.

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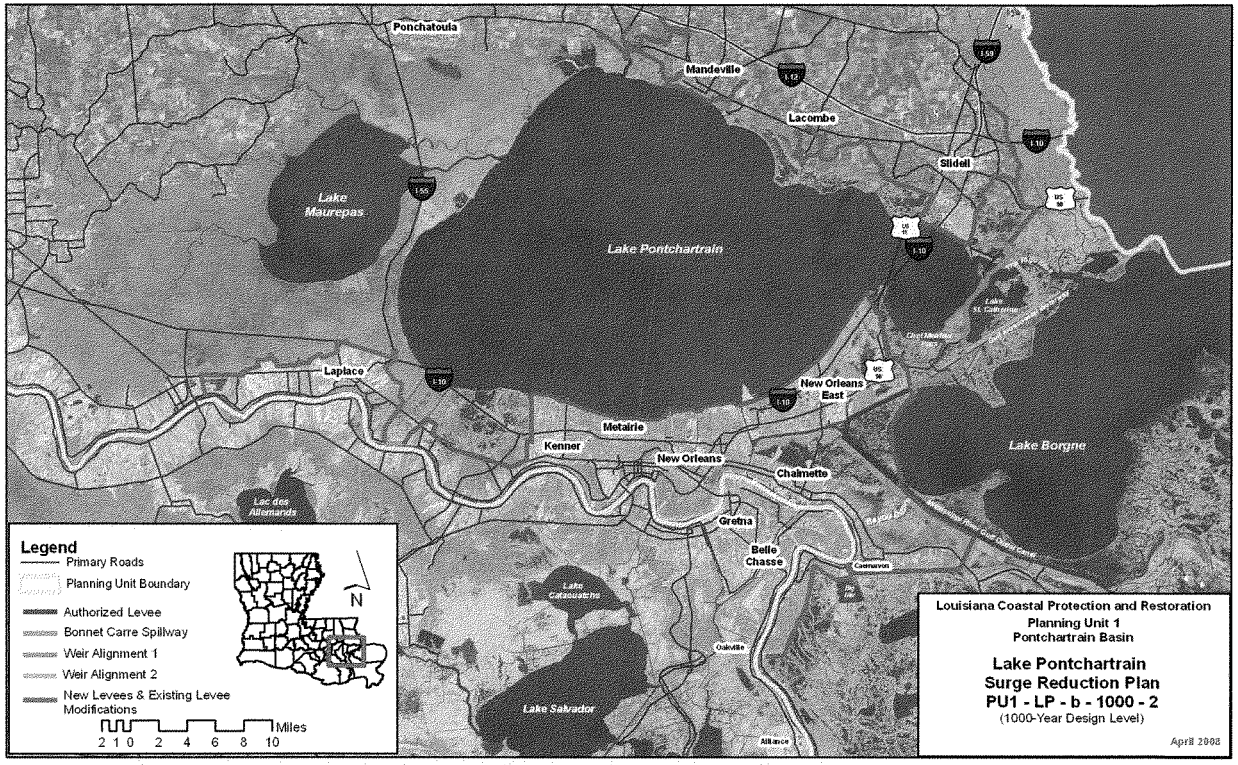
Ponchatoula
Mandeville
Lacombe
Slidell
Lake Maurepas
Lake Pontchartrain
Laplace
New Orleans East
Metairie
Kenner
New Orleans
Chalmette
Lake Borgne
Lac des Allemands
Gretna
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Primary Roads
Planning Unit Boundary
Authorized Levee
Bonnet Carre Spillway
Weir Alignment 1
Weir Alignment 2
New Levees & Existing Levee Modifications
Miles
2 1 0 2 4 6 8 10
N
Louisiana Coastal Protection and Restoration
Planning Unit 1
Pontchartrain Basin
Lake Pontchartrain
Surge Reduction Plan
PU1 - LP - b - 1000 - 2
(1000-Year Design Level)
April 2008

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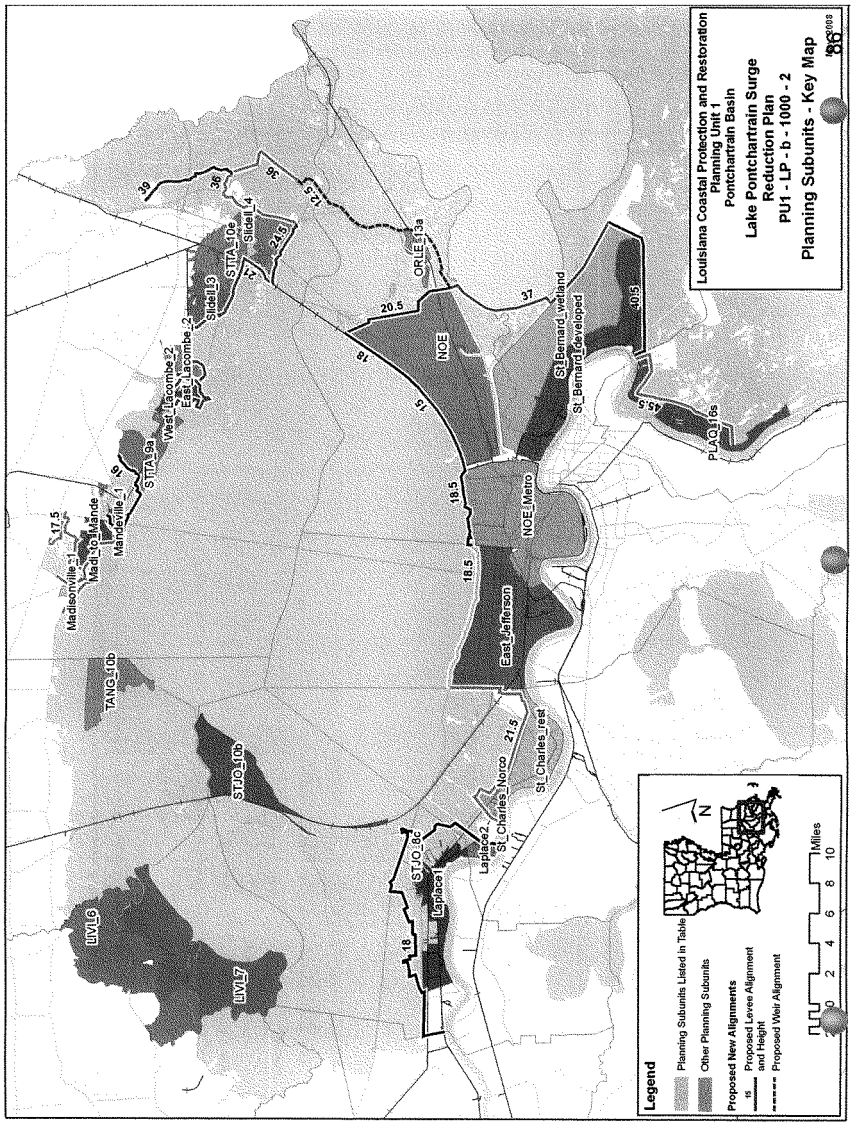
Louisiana Coastal Protection and Restoration
Planning Unit 1
Pontchartrain Basin
Lake Pontchartrain Surge
Reduction Plan
PU1 - LP - b - 1000 - 2
Planning Subunits - Key Map
Legend
Planning Subunits Listed in Table
Other Planning Subunits
Proposed New Alignments
Proposed Levee Alignment and Height
Proposed Weir Alignment
Miles
0 2 4 6 8 10
N
NOE
NOE_Metro
East_Jefferson
St_Bernard_wetland
St_Bernard_developed
PLAQ_16s
ORLE_13a
STTA_10e
Slidell_4
Slidell_3
West_Lacombe_2
East_Lacombe_2
STTA_9a
Mandeville_1
Madi_to_Mande
Madisonville_1
TANG_10b
STJO_10b
STJO_8c
Laplace1
Laplace2
St_Charles_Norco
St_Charles_rest
LIVL6
LIVL7
39
36
36
12.5
24.5
21
20.5
37
40.5
45.5
18
15
18.5
18.5
21.5
18
17.5
16

Alternative: PU1-LP-b-1000-2

Water Surface Elevations (feet - NAVD88 2004.65)

Planning Sub Unit	2010 (Base) Conditions						2060 (Future) Conditions					
	100-yr Event		400-year Event		1,000-yr Event		100-yr Event		400-year Event		1,000-yr Event	
	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project
East_Jefferson	-5.1	-5.3	-1.3	-5.2	4.4	-5.0	-2.6	-5.3	16.0	-5.2	16.0	-5.0
East_Lacombe_2	10.9	4.6	14.3	4.7	15.9	4.9	17.3	4.6	21.7	4.7	23.6	4.9
Laplace1	9.4	4.1	12.2	4.1	14.0	4.5	12.4	4.1	15.0	4.1	16.8	4.5
Laplace2	8.5	4.1	11.0	4.1	12.8	4.5	11.2	4.1	14.3	4.1	16.2	4.5
LIVI_6	7.3	4.1	9.7	5.2	11.1	6.1	10.3	6.7	12.8	7.8	13.9	8.7
LIVI_7	7.5	5.5	9.7	6.9	10.9	7.8	11.0	8.1	13.1	9.5	14.4	10.4
Madi_to_Mande	11.0	5.3	13.1	5.4	14.3	5.8	13.8	5.3	16.7	5.4	18.3	5.8
Madisonville_1	11.7	5.6	14.6	5.7	16.1	6.3	13.5	5.6	15.8	5.7	16.9	6.3
Mandeville_1	11.0	5.9	13.1	6.0	14.3	6.5	14.9	5.9	19.1	6.0	21.4	6.5
NOE	-5.8	-6.0	0.5	-6.0	10.9	-5.9	-0.1	-6.0	16.0	-6.0	16.0	-5.9
NOE_Metro	-5.1	-5.2	-4.8	-5.1	-3.0	-5.1	-5.0	-5.2	16.0	-5.1	16.0	-5.1
ORLE_13a	14.6	16.4	17.8	21.8	19.4	26.5	17.9	19.0	21.5	24.4	23.8	29.1
PLAQ_16s	19.2	-0.1	25.3	0.3	30.0	2.0	21.4	-0.1	27.8	0.3	31.8	2.0
Slidell_3	11.5	4.3	15.1	4.3	16.8	4.6	13.4	4.3	16.8	4.3	18.5	4.6
Slidell_4	14.1	6.2	18.3	6.2	20.4	6.2	20.5	6.2	24.3	6.2	26.5	6.2
St_Bernard_developed	-0.1	-0.4	4.3	-0.3	10.6	0.1	2.3	-0.4	16.0	-0.3	16.0	0.1
St_Bernard_wetland	2.4	1.7	5.2	1.7	10.6	1.8	4.5	1.7	16.0	1.7	16.0	1.8
St_Charles_Norco	4.4	3.4	16.0	3.5	16.0	4.5	11.5	3.4	17.3	3.5	18.6	4.5
St_Charles_rest	2.1	1.9	16.0	1.9	16.0	2.1	11.5	1.9	17.3	1.9	18.6	2.1
STJO_10b	10.6	8.9	12.9	11.4	14.1	12.8	13.3	11.5	15.6	14.0	16.7	15.4
STJO_8c	9.4	4.1	12.2	4.1	14.0	4.5	12.7	4.1	15.4	4.1	17.2	4.5
STTA_10e	12.2	4.3	16.2	4.3	18.2	4.6	13.3	4.3	16.7	4.3	18.6	4.6
STTA_9a	10.4	8.0	12.7	9.4	14.0	10.4	13.2	10.6	15.6	12.0	17.5	13.0
TANG_10b	11.0	7.7	13.6	10.6	15.0	12.1	13.7	10.3	16.3	13.2	17.8	14.7
West_Lacombe_2	10.5	3.6	13.5	3.6	15.0	3.9	13.2	3.6	15.8	3.6	17.3	3.9

Evaluation Parameters				
	Confidence Level:	90%	Levee Design:	No Friction Waves
	Future Relative Sea Level Rise:	2.6 feet	Levee Overtopping:	No Friction Waves

Planning Unit:	1	Alt. No.:	PU1-C-HL-a-100-2	Category:	Comprehensive (Coastal+Structural+Nonstructural)
Alternative Description:	Comprehensive plan--Same coastal and structural measures as Alternative PU1-HL-a-100-2 but with complementary nonstructural measures to reduce residual risk.				
Coastal Component:	R2 (pulsed diversions)		Nonstructural Component:		100-yr complementary measures
Structural Component:	Same as Alternative PU1-HL-a-100-2				

Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	1,672	31,018	264	129	882	36	342	141	51
		Mid		33,710	399	325	1,594	83	312	138	50
		Low		39,008	873	817	3,709	214	282	132	43
2	High RSLR High Employment Dispersed Population	High	1,687	31,392	281	196	1,048	51	342	138	51
		Mid		34,415	445	412	1,837	105	312	135	49
		Low		39,947	1,014	1,102	4,498	289	282	129	41
3	Low RSLR Business-as-Usual Compact Population	High	1,640	27,282	257	129	907	36	342	141	51
		Mid		29,896	388	284	1,551	74	312	138	50
		Low		34,845	831	685	3,480	183	282	132	43
4	High RSLR Business-as-Usual Compact Population	High	1,654	27,491	270	156	994	44	342	138	51
		Mid		30,375	419	326	1,687	86	312	135	49
		Low		35,460	925	928	4,095	243	282	129	41

Other Results				Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Construction Time (years)			12	After 50 yrs (% of baseline)	106	104	106	104
Direct Wetland Impacts (acres)			4,200	After 100 yrs (% of baseline)	104	95	104	95
Indirect Impacts (unitless)			-2	Present Value of Life Cycle Costs ($ Millions)				
Spatial Integrity (unitless)			0.42	Coastal Component	10,666	10,899	10,666	10,899
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)		Nonstructural Component	2,896	2,896	2,254	2,254
	1 / 2	11,777	11,879	Structural Component	19,194	19,251	19,194	19,251
	3 / 4	11,553	11,654	Total Project	32,756	33,046	32,114	32,405

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)								
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4	
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj
10-year	1,215	717	1,472	729	1,081	592	1,345	599
100-year	11,935	1,368	34,000	2,323	9,879	1,106	26,076	1,406
400-year	89,937	49,813	116,204	50,452	62,688	38,075	80,694	38,237
1,000-year	118,260	69,880	122,423	71,216	81,963	51,501	84,515	51,964
2,000-year	122,343	114,192	125,886	115,532	84,351	80,011	86,336	80,443

Planning Unit 1

Comprehensive Plan

High Level Alt

100-year Design

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels.

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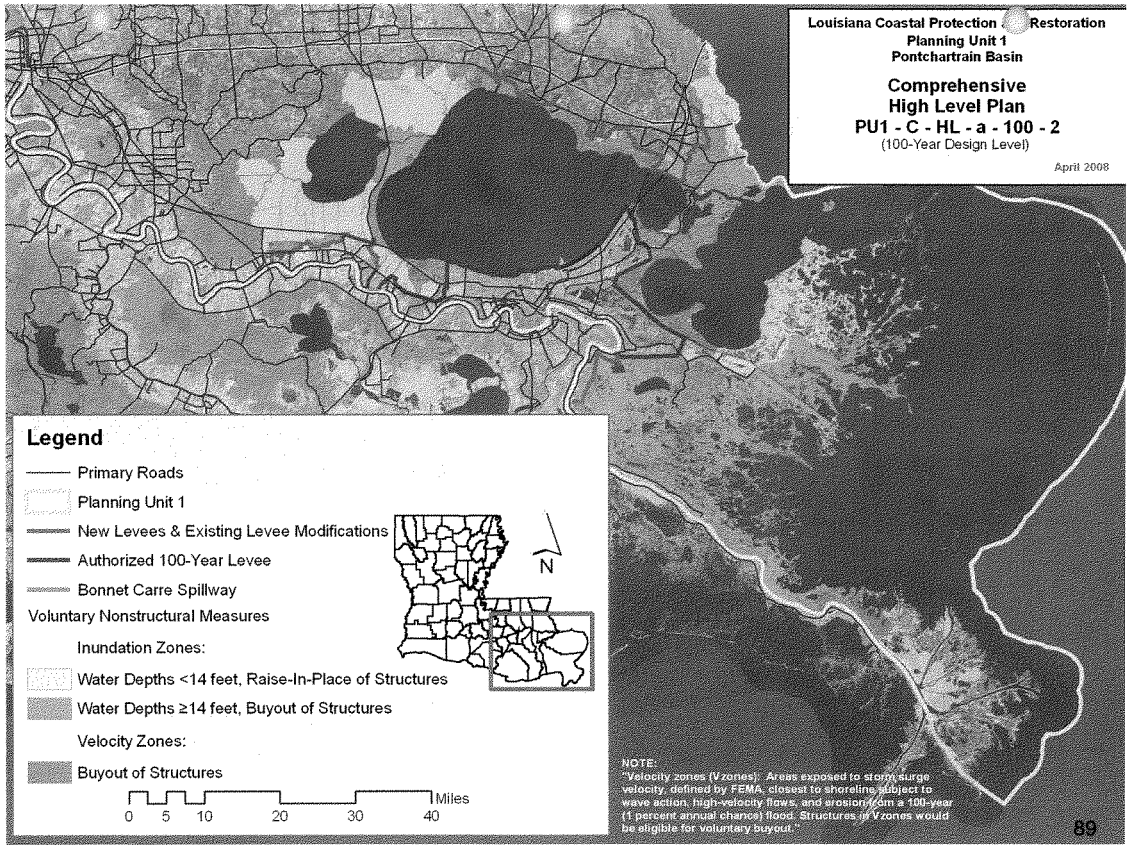

Louisiana Coastal Protection & Restoration
Planning Unit 1
Pontchartrain Basin
Comprehensive
High Level Plan
PU1 - C - HL - a - 100 - 2
(100-Year Design Level)
April 2008
Legend
Primary Roads
Planning Unit 1
New Levees & Existing Levee Modifications
Authorized 100-Year Levee
Bonnet Carre Spillway
Voluntary Nonstructural Measures
Inundation Zones:
Water Depths <14 feet, Raise-In-Place of Structures
Water Depths ≥14 feet, Buyout of Structures
Velocity Zones:
Buyout of Structures
0 5 10 20 30 40
Miles
N
NOTE:
"Velocity zones (Vzones): Areas exposed to storm surge velocity, defined by FEMA, closest to shoreline, subject to wave action, high-velocity flows, and erosion from a 100-year (1 percent annual chance) flood. Structures in Vzones would be eligible for voluntary buyout."
89

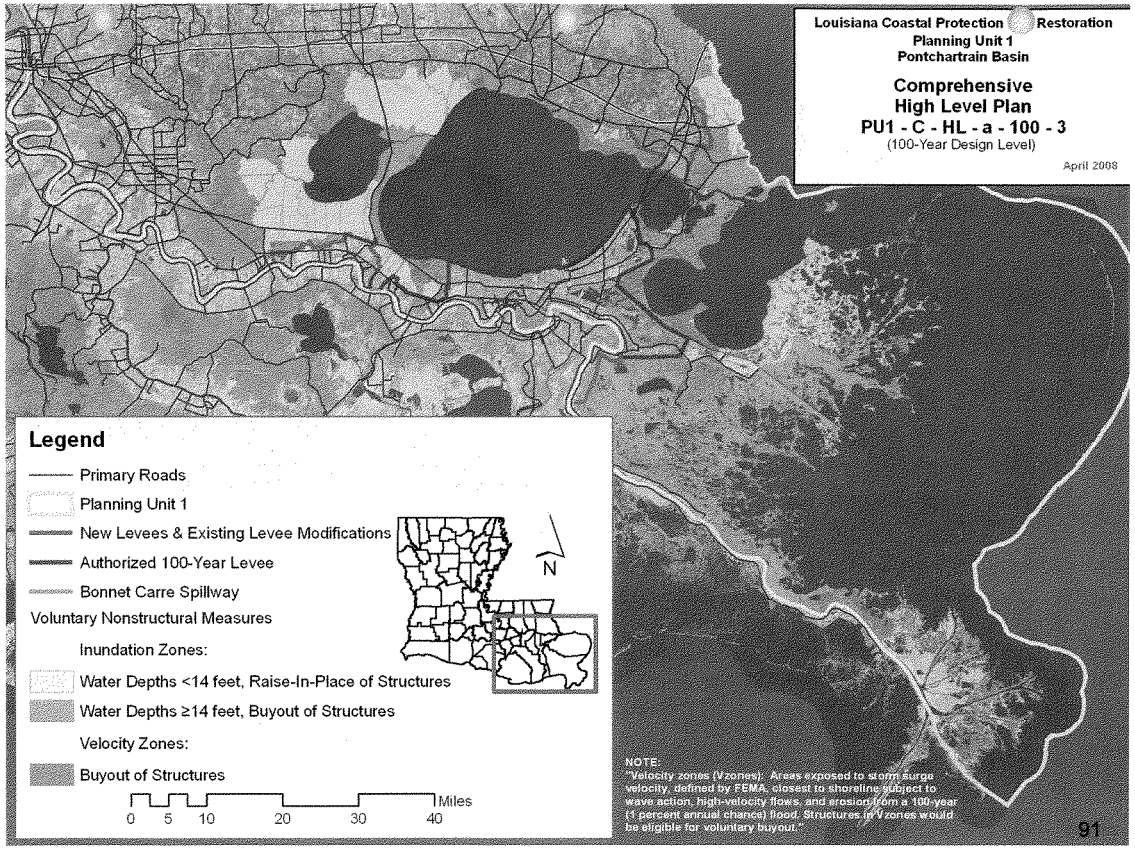
Planning Unit:	1	**Alt. No.:**	PU1-C-HL-a-100-3	**Category:**	Comprehensive (Coastal+Structural+Nonstructural)
Alternative Description:	Comprehensive plan--Same coastal and structural measures as Alternative PU1-HL-a-100-3 but with complementary nonstructural measures to reduce residual risk.				
Coastal Component:	R2 (pulsed diversions)		**Nonstructural Component:**		100-yr complementary measures
Structural Component:	Same as Alternative PU1-HL-a-100-3				

Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	1,514	31,233	263	129	874	36	335	137	51
		Mid		34,023	398	329	1,601	84	305	133	50
		Low		39,309	870	825	3,717	216	275	126	43
2	High RSLR High Employment Dispersed Population	High	1,528	31,712	282	206	1,066	54	335	134	51
		Mid		34,829	448	428	1,875	109	305	128	48
		Low		40,352	1,020	1,120	4,540	294	275	124	40
3	Low RSLR Business-as-Usual Compact Population	High	1,483	27,407	255	128	897	36	335	137	51
		Mid		30,093	385	286	1,549	75	305	133	50
		Low		35,048	827	687	3,468	184	275	126	43
4	High RSLR Business-as-Usual Compact Population	High	1,496	27,686	270	162	1,000	46	335	134	51
		Mid		30,641	419	338	1,718	90	305	128	48
		Low		35,731	926	941	4,121	248	275	124	40

Other Results			Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Construction Time (years)		12	After 50 yrs (% of baseline)	106	104	106	104
Direct Wetland Impacts (acres)		3,600	After 100 yrs (% of baseline)	104	95	104	95
Indirect Impacts (unitless)		-1	Present Value of Life Cycle Costs ($ Millions)				
Spatial Integrity (unitless)		0.42	Coastal Component	10,666	10,899	10,666	10,899
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)	Nonstructural Component	3,102	3,102	2,483	2,483
	1 / 2	10,600 / 10,694	Structural Component	15,893	15,928	15,893	15,928
	3 / 4	10,384 / 10,477	Total Project	29,661	29,929	29,042	29,310

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 1
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	Comprehensive Plan
10-year	1,215	721	1,472	736	1,081	590	1,345	599	
100-year	11,935	1,440	34,000	2,774	9,879	1,157	26,076	1,712	High Level Alt
400-year	89,937	49,754	116,204	50,953	62,688	37,969	80,694	38,452	
1,000-year	118,260	70,154	122,423	72,279	81,963	51,581	84,515	52,420	100-year Design
2,000-year	122,343	114,933	125,886	117,538	84,351	80,285	86,336	81,502	

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels.


Louisiana Coastal Protection Restoration
Planning Unit 1
Pontchartrain Basin
Comprehensive
High Level Plan
PU1 - C - HL - a - 100 - 3
(100-Year Design Level)
April 2008
Legend
Primary Roads
Planning Unit 1
New Levees & Existing Levee Modifications
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Velocity Zones:
Buyout of Structures
Miles
0 5 10 20 30 40
N
NOTE:
"Velocity zones (Vzones). Areas exposed to storm surge velocity, defined by FEMA, closest to shoreline subject to wave action, high-velocity flows, and erosion from a 100-year (1 percent annual chance) flood. Structures in Vzones would be eligible for voluntary buyout."
91

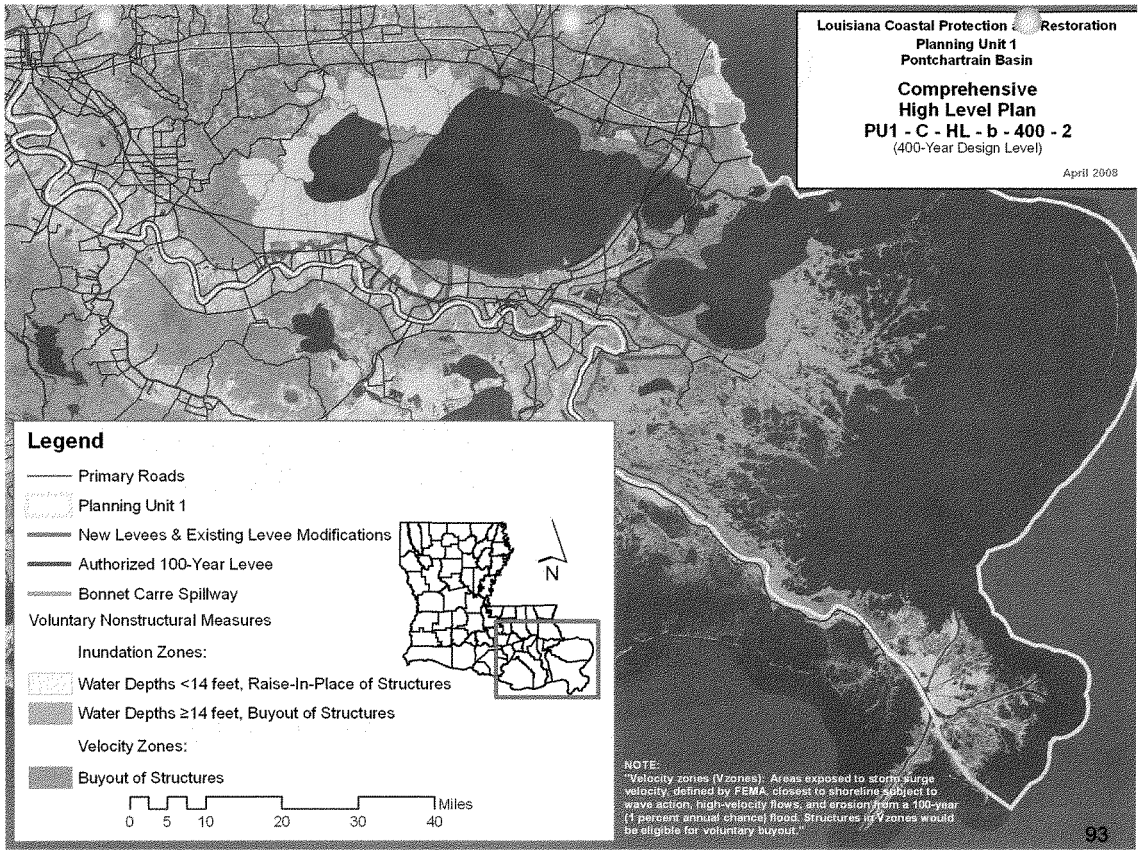
Planning Unit:	1	Alt. No.:	PU1-C-HL-b-400-2	Category:	Comprehensive (Coastal+Structural+Nonstructural)
Alternative Description:	Comprehensive plan--Same coastal and structural measures as Alternative PU1-HL-b-400-2 but with complementary nonstructural measures to reduce residual risk.				
Coastal Component:	R2 (pulsed diversions)		Nonstructural Component:		400-yr complementary measures
Structural Component:	Same as Alternative PU1-HL-b-400-2				

Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	3,238	31,154	279	136	924	37	344	158	52
		Mid		33,173	395	292	1,494	76	314	153	51
		Low		37,294	708	610	2,864	159	284	148	50
2	High RSLR High Employment Dispersed Population	High	3,262	31,611	299	193	1,076	51	344	158	51
		Mid		34,153	449	401	1,801	104	314	150	49
		Low		38,583	890	1,032	4,031	271	284	142	46
3	Low RSLR Business-as-Usual Compact Population	High	3,203	27,820	274	140	964	39	344	158	52
		Mid		29,799	387	268	1,503	72	314	153	51
		Low		33,628	683	504	2,688	136	284	148	50
4	High RSLR Business-as-Usual Compact Population	High	3,228	28,091	292	173	1,075	49	344	158	51
		Mid		30,492	429	326	1,690	88	314	150	49
		Low		34,510	816	865	3,597	225	284	142	46

Other Results			Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Construction Time (years)		16	After 50 yrs (% of baseline)	106	104	106	104
Direct Wetland Impacts (acres)		6,000	After 100 yrs (% of baseline)	104	95	104	95
Indirect Impacts (unitless)		-2	Present Value of Life Cycle Costs ($ Millions)				
Spatial Integrity (unitless)		0.42	Coastal Component	10,666	10,899	10,666	10,899
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)	Nonstructural Component	3,182	3,182	2,506	2,506
	1 / 2	22,623 22,788	Structural Component	49,569	49,808	49,569	49,808
	3 / 4	22,386 22,552	Total Project	63,416	63,889	62,740	63,212

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 1
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		Comprehensive Plan
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	
10-year	1,215	703	1,472	712	1,081	585	1,345	589	High Level Alt
100-year	11,935	980	34,000	1,106	9,879	837	26,076	912	
400-year	89,937	1,531	116,204	2,491	62,688	1,178	80,694	1,432	400-year Design
1,000-year	118,260	5,672	122,423	7,379	81,963	4,049	84,515	4,586	
2,000-year	122,343	22,470	125,886	23,948	84,351	16,517	86,336	16,966	

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels.


Louisiana Coastal Protection & Restoration
Planning Unit 1
Pontchartrain Basin
Comprehensive
High Level Plan
PU1 - C - HL - b - 400 - 2
(400-Year Design Level)
April 2008
Legend
Primary Roads
Planning Unit 1
New Levees & Existing Levee Modifications
Authorized 100-Year Levee
Bonnet Carre Spillway
Voluntary Nonstructural Measures
Inundation Zones:
Water Depths <14 feet, Raise-In-Place of Structures
Water Depths ≥14 feet, Buyout of Structures
Velocity Zones:
Buyout of Structures
0 5 10 20 30 40 Miles
N
NOTE:
"Velocity zones (Vzones): Areas exposed to storm surge velocity, defined by FEMA, closest to shoreline subject to wave action, high-velocity flows, and erosion from a 100-year (1 percent annual chance) flood. Structures in Vzones would be eligible for voluntary buyout."
93

Planning Unit:	1	Alt. No.:	PU1-C-HL-b-400-3	Category:	Comprehensive (Coastal+Structural+Nonstructural)
Alternative Description:	Comprehensive plan--Same coastal and structural measures as Alternative PU1-HL-b-400-3 but with complementary nonstructural measures to reduce residual risk.				
Coastal Component:	R2 (pulsed diversions)		Nonstructural Component:		400-yr complementary measures
Structural Component:	Same as Alternative PU1-HL-b-400-3				

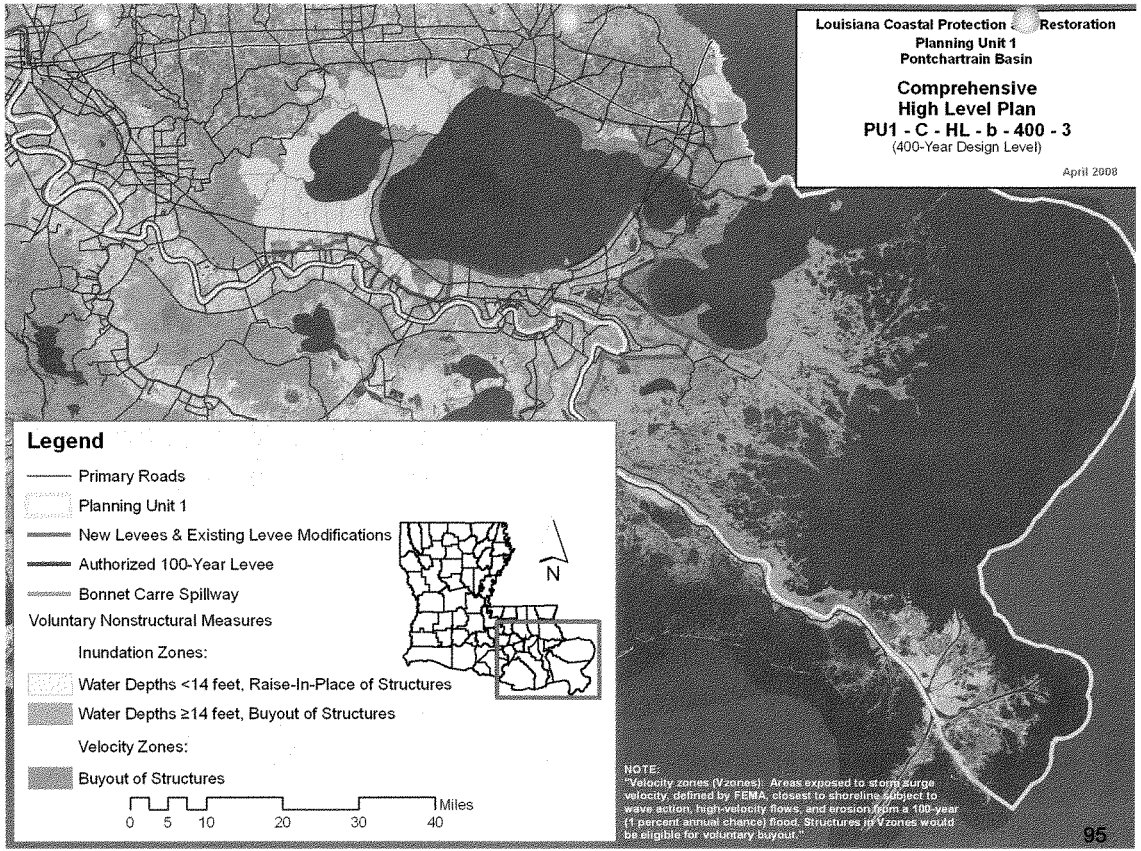
Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	3,011	31,321	277	134	910	37	307	143	51
		Mid		33,435	391	291	1,481	76	307	143	50
		Low		37,636	704	610	2,853	159	277	140	48
2	High RSLR High Employment Dispersed Population	High	3,034	31,863	297	192	1,063	51	337	143	51
		Mid		34,496	446	402	1,796	104	307	141	49
		Low		39,009	889	1,036	4,037	272	277	133	45
3	Low RSLR Business-as-Usual Compact Population	High	2,986	27,914	271	138	948	38	307	143	51
		Mid		29,965	383	267	1,489	71	307	143	50
		Low		33,867	678	504	2,676	136	277	140	48
4	High RSLR Business-as-Usual Compact Population	High	3,009	28,241	289	172	1,061	49	337	143	51
		Mid		30,714	426	326	1,683	89	307	141	49
		Low		34,803	812	867	3,600	227	277	133	45

Other Results			
Construction Time (years)			16
Direct Wetland Impacts (acres)			5,500
Indirect Impacts (unitless)			-2
Spatial Integrity (unitless)			0.42
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)	
	1 / 2	20,985	21,140
	3 / 4	20,815	20,970

Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
After 50 yrs (% of baseline)	106	104	106	104
After 100 yrs (% of baseline)	104	95	104	95
Present Value of Life Cycle Costs ($ Millions)				
Coastal Component	10,666	10,899	10,666	10,899
Nonstructural Component	3,415	3,415	2,929	2,929
Structural Component	44,895	45,103	44,895	45,103
Total Project	58,975	59,417	58,489	58,931

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 1
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	
10-year	1,215	708	1,472	721	1,081	584	1,345	591	Comprehensive Plan
100-year	11,935	1,023	34,000	1,248	9,879	869	26,076	1,029	High Level Alt
400-year	89,937	1,793	116,204	3,387	62,688	1,389	80,694	2,019	
1,000-year	118,260	6,558	122,423	9,086	81,963	4,590	84,515	5,527	400-year Design
2,000-year	122,343	23,779	125,886	26,611	84,351	17,141	86,336	18,415	

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels.


Louisiana Coastal Protection & Restoration
Planning Unit 1
Pontchartrain Basin
Comprehensive
High Level Plan
PU1 - C - HL - b - 400 - 3
(400-Year Design Level)
April 2008
Legend
Primary Roads
Planning Unit 1
New Levees & Existing Levee Modifications
Authorized 100-Year Levee
Bonnet Carre Spillway
Voluntary Nonstructural Measures
Inundation Zones:
Water Depths <14 feet, Raise-In-Place of Structures
Water Depths ≥14 feet, Buyout of Structures
Velocity Zones:
Buyout of Structures
0 5 10 20 30 40 Miles
N
NOTE:
"Velocity zones (Vzones): Areas exposed to storm surge velocity, defined by FEMA, closest to shoreline subject to wave action, high-velocity flows, and erosion from a 100-year (1 percent annual chance) flood. Structures in Vzones would be eligible for voluntary buyout."
95

Planning Unit:	1	Alt. No.:	PU1-C-LP-a-100-1	Category:	Comprehensive (Coastal+Structural+Nonstructural)
Alternative Description:	Comprehensive plan--Same coastal and structural measures as Alternative PU1-LP-a-100-1 but with complementary nonstructural measures to reduce residual risk.				
Coastal Component:	R2 (pulsed diversions)		Nonstructural Component:		100-yr complementary measures
Structural Component:	Same as Alternative PU1-LP-a-100-1				

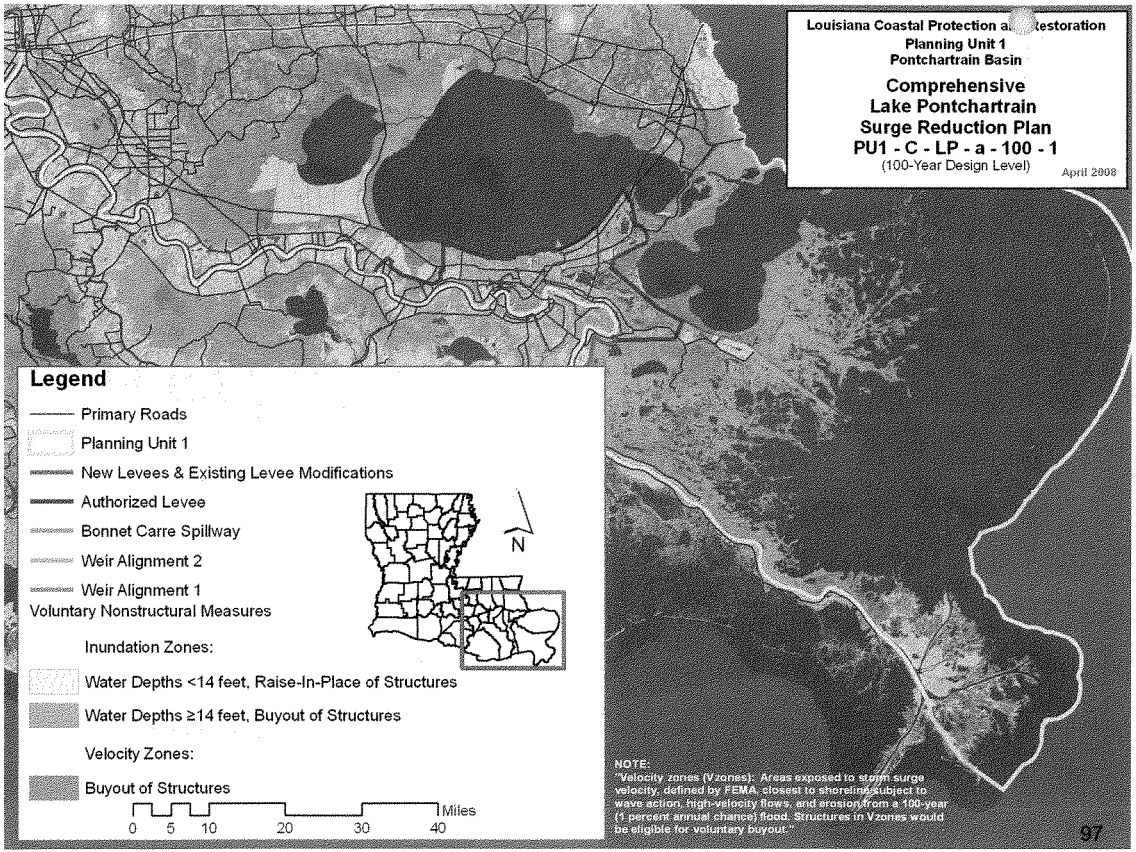
Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	1,100	31,885	271	132	825	35	325	140	51
		Mid		34,496	387	299	1,421	78	295	133	50
		Low		39,725	744	710	3,102	183	265	127	43
2	High RSLR High Employment Dispersed Population	High	1,118	32,929	295	211	1,068	59	325	136	51
		Mid		36,027	450	451	1,815	114	295	129	45
		Low		41,341	933	1,115	4,183	287	265	123	40
3	Low RSLR Business-as-Usual Compact Population	High	1,071	28,339	264	131	870	36	325	140	51
		Mid		30,883	378	263	1,411	71	295	133	50
		Low		35,788	712	557	2,869	152	265	127	43
4	High RSLR Business-as-Usual Compact Population	High	1,088	29,053	285	175	1,022	50	325	136	51
		Mid		32,008	428	333	1,644	92	295	129	45
		Low		36,932	851	891	3,701	234	265	123	40

Other Results			
Construction Time (years)			14
Direct Wetland Impacts (acres)			1,000
Indirect Impacts (unitless)			-8
Spatial Integrity (unitless)			0.42
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)	
	1 / 2	7,609	7,729
	3 / 4	7,407	7,527

Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
After 50 yrs (% of baseline)	106	104	106	104
After 100 yrs (% of baseline)	104	95	104	95
Present Value of Life Cycle Costs ($ Millions)				
Coastal Component	10,666	10,899	10,666	10,899
Nonstructural Component	3,869	3,869	3,291	3,291
Structural Component	7,024	7,132	7,024	7,132
Total Project	21,559	21,901	20,981	21,323

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 1
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		Comprehensive Plan
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	Lake Pontchartrain Surge Reduction Alt
10-year	1,215	723	1,472	784	1,081	594	1,345	646	100-year Design
100-year	11,935	1,703	34,000	3,524	9,879	1,516	26,076	2,955	
400-year	89,937	16,335	116,204	20,709	62,688	11,352	80,694	14,331	
1,000-year	118,260	50,410	122,423	54,445	81,963	35,865	84,515	38,371	
2,000-year	122,343	104,180	125,886	107,583	84,351	73,593	86,336	75,637	

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels.


Louisiana Coastal Protection a estoration
Planning Unit 1
Pontchartrain Basin
Comprehensive
Lake Pontchartrain
Surge Reduction Plan
PU1 - C - LP - a - 100 - 1
(100-Year Design Level)
April 2008
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Primary Roads
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N
0 5 10 20 30 40
Miles
NOTE:
"Velocity zones (Vzones): Areas exposed to storm surge velocity, defined by FEMA, closest to shoreline subject to wave action, high-velocity flows, and erosion from a 100-year (1 percent annual chance) flood. Structures in Vzones would be eligible for voluntary buyout."
97

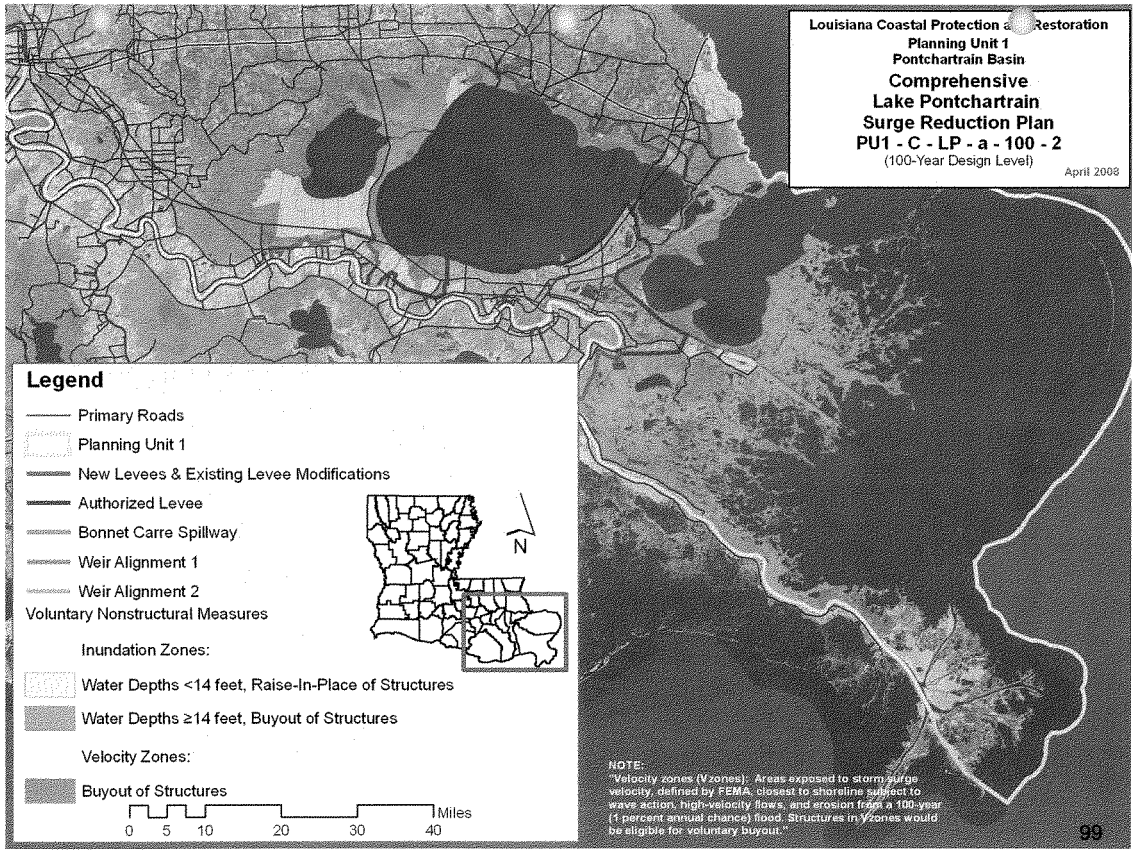
Planning Unit:	1	**Alt. No.:**	PU1-C-LP-a-100-2	**Category:**	Comprehensive (Coastal+Structural+Nonstructural)
Alternative Description:	Comprehensive plan--Same coastal and structural measures as Alternative PU1-LP-a-100-2 but with complementary nonstructural measures to reduce residual risk.				
Coastal Component:	R2 (pulsed diversions)			**Nonstructural Component:**	100-yr complementary measures
Structural Component:	Same as Alternative PU1-LP-a-100-2				

Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	1,834	30,998	276	133	884	37	361	145	51
		Mid		33,212	399	292	1,479	76	331	137	50
		Low		37,747	751	661	3,057	172	301	134	43
2	High RSLR High Employment Dispersed Population	High	1,853	31,467	294	184	1,017	49	361	138	51
		Mid		34,100	446	394	1,746	100	331	135	49
		Low		38,891	905	1,017	4,049	267	301	129	41
3	Low RSLR Business-as-Usual Compact Population	High	1,798	27,582	270	137	943	38	361	145	51
		Mid		29,762	391	269	1,512	72	331	137	50
		Low		33,915	721	544	2,892	147	301	134	43
4	High RSLR Business-as-Usual Compact Population	High	1,817	27,843	285	165	1,038	47	361	138	51
		Mid		30,381	428	316	1,669	85	331	135	49
		Low		34,669	832	842	3,646	221	301	129	41

Other Results				Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Construction Time (years)			14	After 50 yrs (% of baseline)	106	104	106	104
Direct Wetland Impacts (acres)			4,100	After 100 yrs (% of baseline)	104	95	104	95
Indirect Impacts (unitless)			-8	Present Value of Life Cycle Costs ($ Millions)				
Spatial Integrity (unitless)			0.42	Coastal Component	10,666	10,899	10,666	10,899
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)		Nonstructural Component	2,820	2,820	2,113	2,113
	1 / 2	12,792	12,923	Structural Component	22,443	22,582	22,443	22,582
	3 / 4	12,545	12,675	Total Project	35,929	36,301	35,222	35,594

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 1 Comprehensive Plan Lake Pontchartrain Surge Reduction Alt 100-year Design
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	
10-year	1,215	713	1,472	734	1,081	593	1,345	612	
100-year	11,935	1,109	34,000	1,310	9,879	952	26,076	1,062	
400-year	89,937	14,016	116,204	14,462	62,688	9,602	80,694	9,803	
1,000-year	118,260	47,839	122,423	48,458	81,963	33,836	84,515	34,043	
2,000-year	122,343	102,967	125,886	103,784	84,351	72,511	86,336	72,749	

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels.


Louisiana Coastal Protection a Restoration
Planning Unit 1
Pontchartrain Basin
Comprehensive
Lake Pontchartrain
Surge Reduction Plan
PU1 - C - LP - a - 100 - 2
(100-Year Design Level)
April 2008
Legend
Primary Roads
Planning Unit 1
New Levees & Existing Levee Modifications
Authorized Levee
Bonnet Carre Spillway
Weir Alignment 1
Weir Alignment 2
Voluntary Nonstructural Measures
Inundation Zones:
Water Depths <14 feet, Raise-In-Place of Structures
Water Depths ≥14 feet, Buyout of Structures
Velocity Zones:
Buyout of Structures
N
0 5 10 20 30 40
Miles
NOTE:
"Velocity zones (V-zones): Areas exposed to storm surge velocity, defined by FEMA, closest to shoreline subject to wave action, high-velocity flows, and erosion from a 100-year (1 percent annual chance) flood. Structures in V-zones would be eligible for voluntary buyout."
99

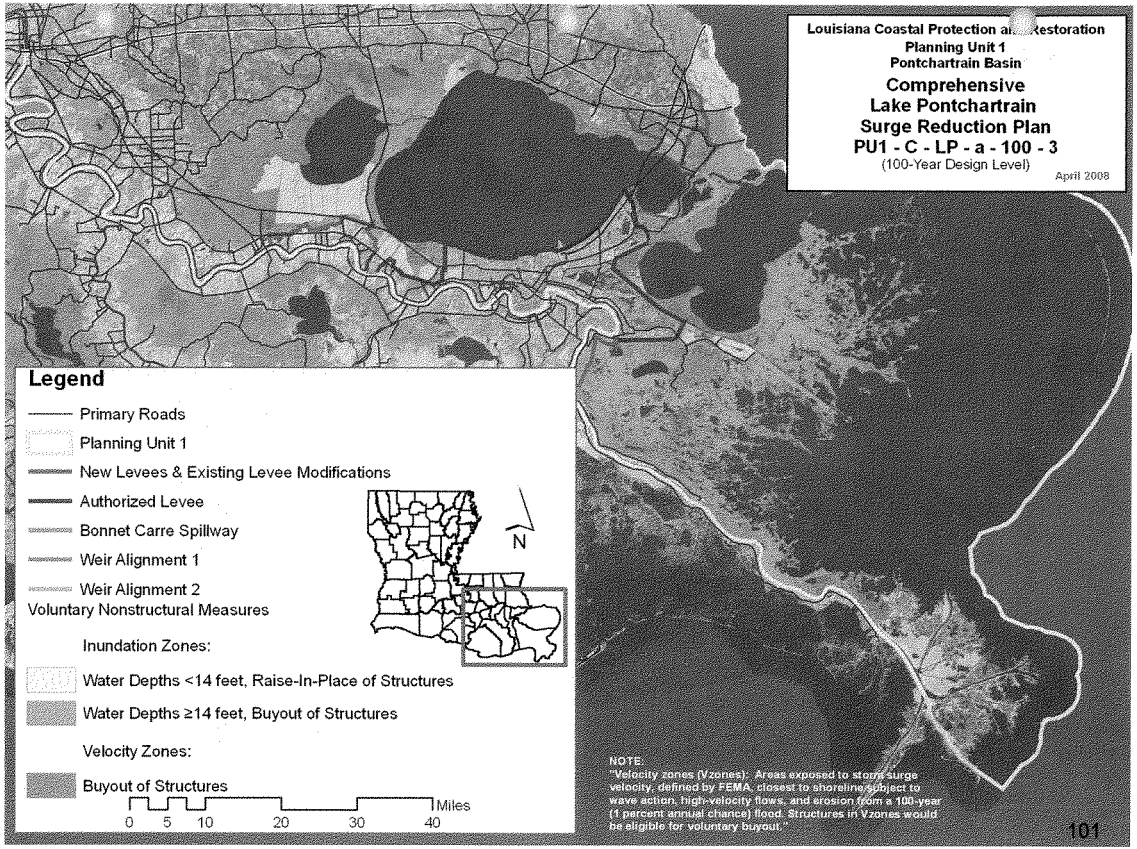
Planning Unit:	1	Alt. No.:	PU1-C-LP-a-100-3	Category:	Comprehensive (Coastal+Structural+Nonstructural)
Alternative Description:	Comprehensive plan--Same coastal and structural measures as Alternative PU1-LP-a-100-3 but with complementary nonstructural measures to reduce residual risk.				
Coastal Component:	R2 (pulsed diversions)		Nonstructural Component:		100-yr complementary measures
Structural Component:	Same as Alternative PU1-LP-a-100-3				

Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	1,773	31,162	275	134	876	36	354	143	51
		Mid		33,433	397	294	1,477	76	324	133	50
		Low		37,976	750	667	3,068	174	294	127	43
2	High RSLR High Employment Dispersed Population	High	1,795	31,715	294	189	1,030	51	354	137	51
		Mid		34,395	447	402	1,763	102	324	128	45
		Low		39,208	909	1,031	4,081	271	294	123	40
3	Low RSLR Business-as-Usual Compact Population	High	1,738	27,654	269	137	932	35	354	143	51
		Mid		29,874	389	269	1,503	72	324	133	50
		Low		34,048	718	547	2,894	148	294	127	43
4	High RSLR Business-as-Usual Compact Population	High	1,760	27,956	285	168	1,039	48	354	137	51
		Mid		30,534	428	321	1,673	87	324	128	45
		Low		34,853	833	851	3,663	224	294	123	40

Other Results			Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Construction Time (years)		14	After 50 yrs (% of baseline)	106	104	106	104
Direct Wetland Impacts (acres)		3,700	After 100 yrs (% of baseline)	104	95	104	95
Indirect Impacts (unitless)		-8	Present Value of Life Cycle Costs ($ Millions)				
Spatial Integrity (unitless)		0.42	Coastal Component	10,666	10,899	10,666	10,899
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)	Nonstructural Component	2,977	2,977	2,287	2,287
	1 / 2	12,326 12,473	Structural Component	21,092	21,279	21,092	21,279
	3 / 4	12,085 12,232	Total Project	34,735	35,155	34,045	34,465

Frequency	2075 Residual Risk / Damages - Low Uncertainty ($ Millions)								Planning Unit 1 Comprehensive Plan Lake Pontchartrain Surge Reduction Alt 100-year Design
	Scenario 1		Scenario 2		Scenario 3		Scenario 4		
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	
10-year	1,215	714	1,472	738	1,081	590	1,345	611	
100-year	11,935	1,166	34,000	1,599	9,879	991	26,076	1,257	
400-year	89,937	14,212	116,204	15,043	62,688	9,672	80,694	10,069	
1,000-year	118,260	48,364	122,423	49,464	81,963	34,033	84,515	34,504	
2,000-year	122,343	103,665	125,886	104,997	84,351	72,777	86,336	73,318	

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels.


Louisiana Coastal Protection and Restoration
Planning Unit 1
Pontchartrain Basin
Comprehensive
Lake Pontchartrain
Surge Reduction Plan
PU1 - C - LP - a - 100 - 3
(100-Year Design Level)
April 2008
Legend
Primary Roads
Planning Unit 1
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Bonnet Carre Spillway
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Water Depths ≥14 feet, Buyout of Structures
Velocity Zones:
Buyout of Structures
N
0 5 10 20 30 40
Miles
NOTE:
"Velocity zones (Vzones): Areas exposed to storm surge velocity, defined by FEMA, closest to shoreline subject to wave action, high-velocity flows, and erosion from a 100-year (1 percent annual chance) flood. Structures in Vzones would be eligible for voluntary buyout."
101

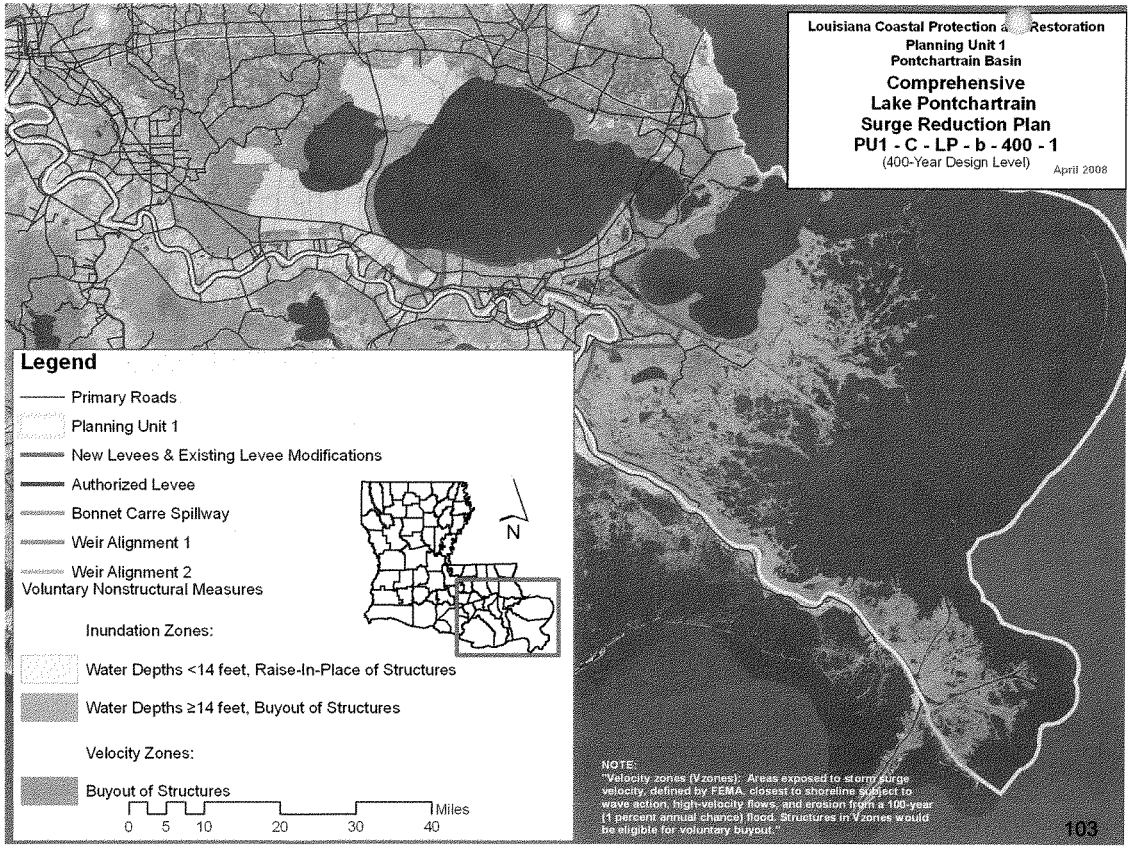
Planning Unit:	1	Alt. No.:	PU1-C-LP-b-400-1	Category:	Comprehensive (Coastal+Structural+Nonstructural)
Alternative Description:	Comprehensive plan--Same coastal and structural measures as Alternative PU1-LP-b-400-1 but with complementary nonstructural measures to reduce residual risk.				
Coastal Component:	R2 (pulsed diversions)		Nonstructural Component:		400-yr complementary measures
Structural Component:	Same as Alternative PU1-LP-b-400-1				

Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	2,147	31,572	272	123	816	34	327	142	51
		Mid		34,075	378	277	1,346	72	297	137	50
		Low		38,960	684	611	2,758	161	267	131	48
2	High RSLR High Employment Dispersed Population	High	2,163	32,555	293	186	987	50	354	138	51
		Mid		35,646	436	416	1,768	111	324	133	50
		Low		40,681	878	1,069	4,039	284	294	129	45
3	Low RSLR Business-as-Usual Compact Population	High	2,178	28,231	266	132	882	36	327	142	51
		Mid		30,703	372	257	1,371	68	297	137	50
		Low		35,332	661	505	2,581	137	267	131	48
4	High RSLR Business-as-Usual Compact Population	High	2,194	28,906	285	169	1,005	48	354	138	51
		Mid		31,862	417	330	1,615	90	324	133	50
		Low		36,557	803	884	3,555	233	294	129	45

Other Results			Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Construction Time (years)		16	After 50 yrs (% of baseline)	106	104	106	104
Direct Wetland Impacts (acres)		4,200	After 100 yrs (% of baseline)	104	95	104	95
Indirect Impacts (unitless)		-8	Present Value of Life Cycle Costs ($ Millions)				
Spatial Integrity (unitless)		0.42	Coastal Component	10,666	10,899	10,666	10,899
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)	Nonstructural Component	5,858	5,858	6,453	6,453
	1 / 2	14,804 14,915	Structural Component	25,538	25,620	25,538	25,620
	3 / 4	15,012 15,123	Total Project	42,061	42,377	42,656	42,972

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 1
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		Comprehensive Plan
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	Lake Pontchartrain Surge Reduction Alt
10-year	1,215	704	1,472	749	1,081	579	1,345	614	400-year Design
100-year	11,935	1,175	34,000	1,544	9,879	995	26,076	1,277	
400-year	89,937	2,761	116,204	8,697	62,688	2,367	80,694	6,868	
1,000-year	118,260	14,209	122,423	18,516	81,963	11,121	84,515	13,955	
2,000-year	122,343	33,494	125,886	37,673	84,351	25,057	86,336	27,508	

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels.


Louisiana Coastal Protection & Restoration
Planning Unit 1
Pontchartrain Basin
Comprehensive
Lake Pontchartrain
Surge Reduction Plan
PU1 - C - LP - b - 400 - 1
(400-Year Design Level)
April 2008
Legend
Primary Roads
Planning Unit 1
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Buyout of Structures
0 5 10 20 30 40
Miles
N
NOTE:
"Velocity zones (Vzones): Areas exposed to storm surge velocity, defined by FEMA, closest to shoreline subject to wave action, high-velocity flows, and erosion from a 100-year (1 percent annual chance) flood. Structures in Vzones would be eligible for voluntary buyout."
103

Planning Unit:	1	Alt. No.:	PU1-C-LP-b-400-3	Category:	Comprehensive (Coastal+Structural+Nonstructural)
Alternative Description:	Comprehensive plan--Same coastal and structural measures as Alternative PU1-LP-b-400-3 but with complementary nonstructural measures to reduce residual risk.				
Coastal Component:	R2 (pulsed diversions)		Nonstructural Component:		400-yr complementary measures
Structural Component:	Same as Alternative PU1-LP-b-400-3				

Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	3,008	31,109	279	130	878	36	356	149	51
		Mid		33,133	393	286	1,449	75	326	146	50
		Low		37,263	705	605	2,830	160	296	141	48
2	High RSLR High Employment Dispersed Population	High	3,028	31,666	300	191	1,044	51	356	147	51
		Mid		34,208	448	402	1,781	105	326	142	50
		Low		38,647	889	1,034	4,015	273	296	134	45
3	Low RSLR Business-as-Usual Compact Population	High	2,975	27,852	275	139	952	38	356	149	51
		Mid		29,818	388	267	1,489	71	326	146	50
		Low		33,650	684	506	2,688	137	296	141	48
4	High RSLR Business-as-Usual Compact Population	High	2,995	28,167	293	175	1,072	50	356	147	51
		Mid		30,571	431	328	1,689	89	326	142	50
		Low		34,577	819	869	3,608	227	296	134	45

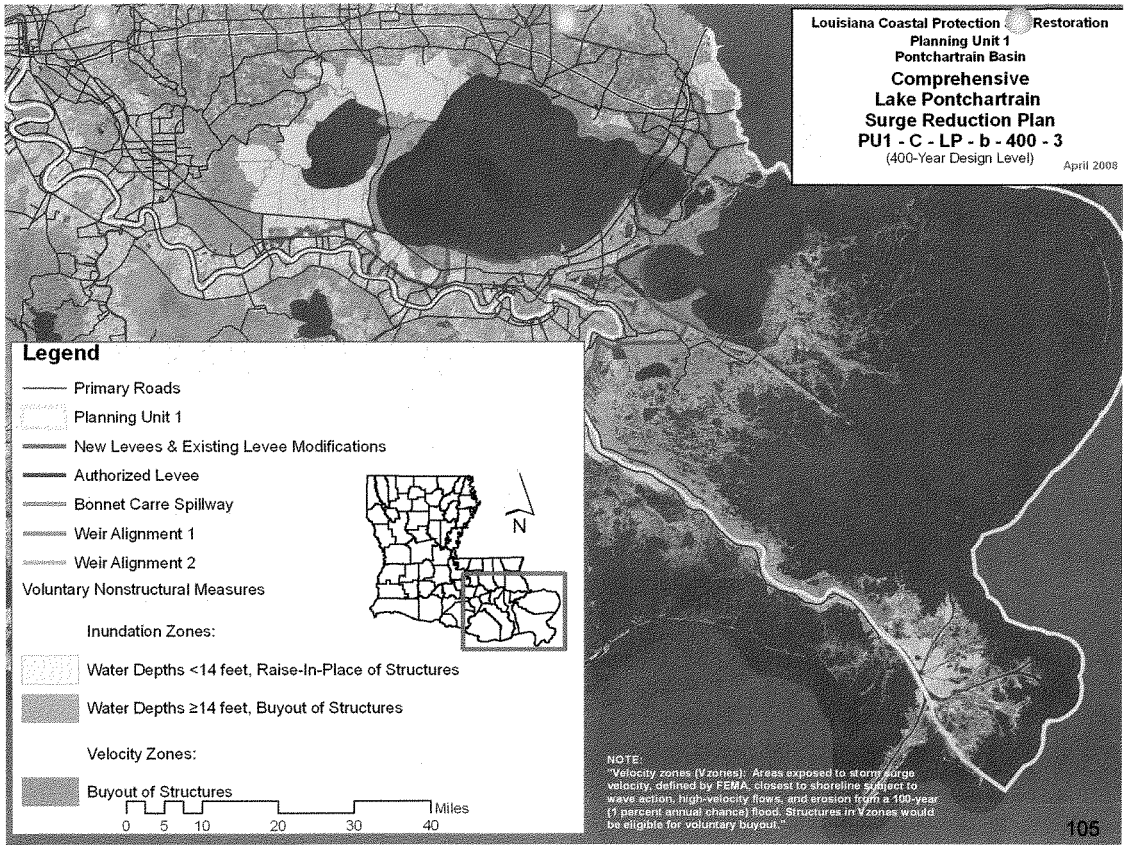
Other Results			
Construction Time (years)			16
Direct Wetland Impacts (acres)			7,500
Indirect Impacts (unitless)			-8
Spatial Integrity (unitless)			0.42
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)	
	1 / 2	20,843	20,980
	3 / 4	20,615	20,752

Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
After 50 yrs (% of baseline)	106	104	106	104
After 100 yrs (% of baseline)	104	95	104	95
Present Value of Life Cycle Costs ($ Millions)				
Coastal Component	10,666	10,899	10,666	10,899
Nonstructural Component	3,172	3,172	2,520	2,520
Structural Component	45,081	45,238	45,081	45,238
Total Project	58,919	59,309	58,267	58,657

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)								
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4	
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj
10-year	1,215	702	1,472	720	1,081	583	1,345	597
100-year	11,935	995	34,000	1,218	9,879	855	26,076	1,024
400-year	89,937	1,337	116,204	2,323	62,688	1,127	80,694	1,514
1,000-year	118,260	6,866	122,423	8,000	81,963	5,668	84,515	6,172
2,000-year	122,343	25,731	125,886	27,153	84,351	20,497	86,336	21,082

Planning Unit 1
Comprehensive Plan
Lake Pontchartrain Surge Reduction Alt
400-year Design

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels.


Louisiana Coastal Protection & Restoration
Planning Unit 1
Pontchartrain Basin
Comprehensive
Lake Pontchartrain
Surge Reduction Plan
PU1 - C - LP - b - 400 - 3
(400-Year Design Level)
April 2008
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Buyout of Structures
0 5 10 20 30 40
Miles
N
NOTE:
"Velocity zones (V zones): Areas exposed to storm surge velocity, defined by FEMA, closest to shoreline subject to wave action, high-velocity flows, and erosion from a 100-year (1 percent annual chance) flood. Structures in V zones would be eligible for voluntary buyout."
105

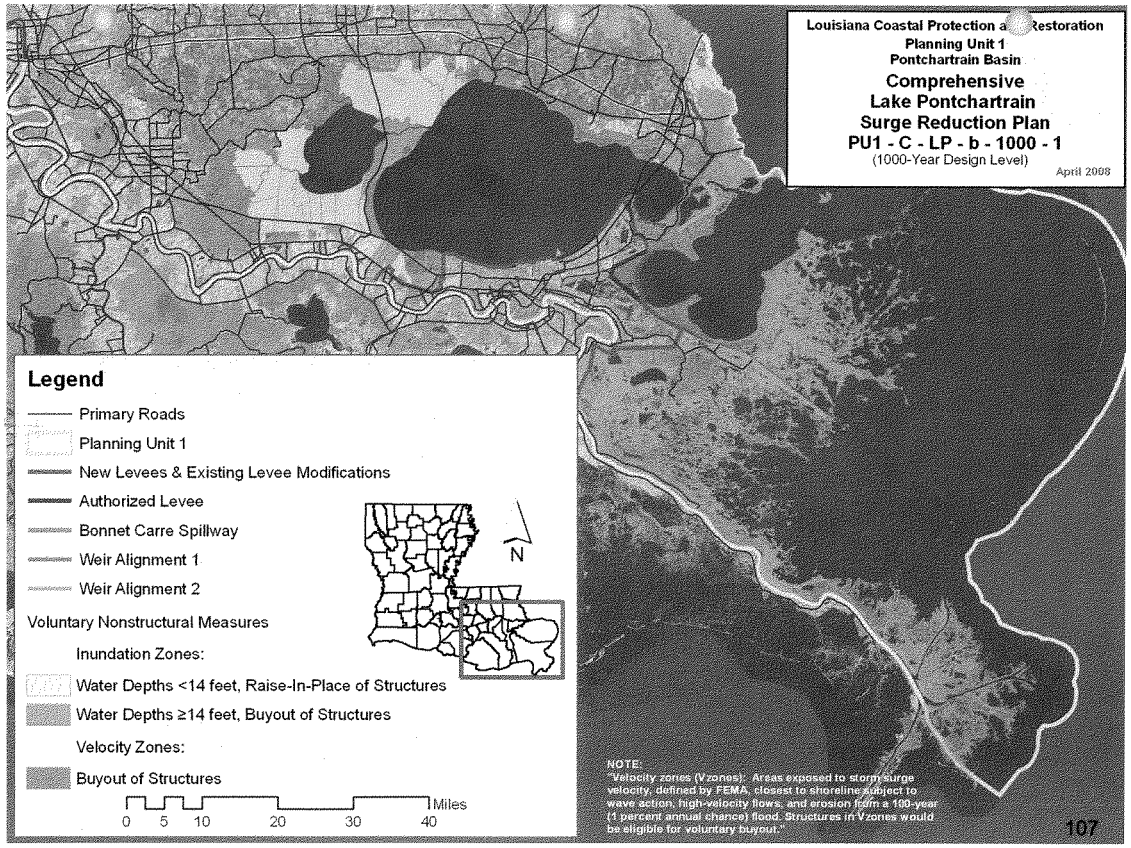
Planning Unit:	1	Alt. No.:	PU1-C-LP-b-1000-1	Category:	Comprehensive (Coastal+Structural+Nonstructural)
Alternative Description:	Comprehensive plan--Same coastal and structural measures as Alternative PU1-LP-b-1000-1 but with complementary nonstructural measures to reduce residual risk.				
Coastal Component:	R2 (pulsed diversions)		Nonstructural Component:		1000-yr complementary measures
Structural Component:	Same as Alternative PU1-LP-b-1000-1				

Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	2,579	31,285	270	123	816	34	327	142	51
		Mid		33,710	375	272	1,326	71	297	137	50
		Low		38,446	667	575	2,618	151	267	131	48
2	High RSLR High Employment Dispersed Population	High	2,602	32,247	290	180	966	48	327	138	51
		Mid		35,269	429	382	1,642	99	297	133	50
		Low		40,146	852	1,019	3,867	270	267	129	45
3	Low RSLR Business-as-Usual Compact Population	High	2,667	28,145	265	132	881	36	327	142	51
		Mid		30,547	369	253	1,353	67	297	137	50
		Low		35,039	645	477	2,447	128	267	131	48
4	High RSLR Business-as-Usual Compact Population	High	2,690	28,809	282	165	992	46	327	138	51
		Mid		31,700	411	310	1,545	84	297	133	50
		Low		36,257	780	851	3,410	223	267	129	45

Other Results			Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Construction Time (years)		16	After 50 yrs (% of baseline)	106	104	106	104
Direct Wetland Impacts (acres)		5,100	After 100 yrs (% of baseline)	104	95	104	95
Indirect Impacts (unitless)		-8	Present Value of Life Cycle Costs ($ Millions)				
Spatial Integrity (unitless)		0.42	Coastal Component	10,666	10,899	10,666	10,899
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)	Nonstructural Component	6,508	6,508	8,243	8,243
	1 / 2	17,906	Structural Component	33,339	33,562	33,339	33,562
	3 / 4	18,513	Total Project	50,512	50,969	52,248	52,704

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 1
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		Comprehensive Plan
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	Lake Pontchartrain Surge Reduction Alt
10-year	1,215	695	1,472	732	1,081	573	1,345	599	1000-year Design
100-year	11,935	1,125	34,000	1,296	9,879	953	26,076	1,086	
400-year	89,937	1,408	116,204	2,250	62,688	1,195	80,694	1,750	
1,000-year	118,260	3,324	122,423	10,985	81,963	2,636	84,515	8,711	
2,000-year	122,343	12,020	125,886	17,240	84,351	10,022	86,336	13,278	

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels.


Louisiana Coastal Protection a Restoration
Planning Unit 1
Pontchartrain Basin
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PU1 - C - LP - b - 1000 - 1
(1000-Year Design Level)
April 2008
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Buyout of Structures
N
0 5 10 20 30 40
Miles
NOTE:
"Velocity zones (Vzones): Areas exposed to storm surge velocity, defined by FEMA, closest to shoreline subject to wave action, high-velocity flows, and erosion from a 100-year (1 percent annual chance) flood. Structures in Vzones would be eligible for voluntary buyout."
107

1750

Planning Unit:	1	Alt. No.:	PU1-C-LP-b-1000-2	Category:	Comprehensive (Coastal+Structural+Nonstructural)
Alternative Description:	Comprehensive plan--Same coastal and structural measures as Alternative PU1-LP-b-1000-2 but with complementary nonstructural measures to reduce residual risk.				
Coastal Component:	R2 (pulsed diversions)		Nonstructural Component:		1000-yr complementary measures
Structural Component:	Same as Alternative PU1-LP-b-1000-2				

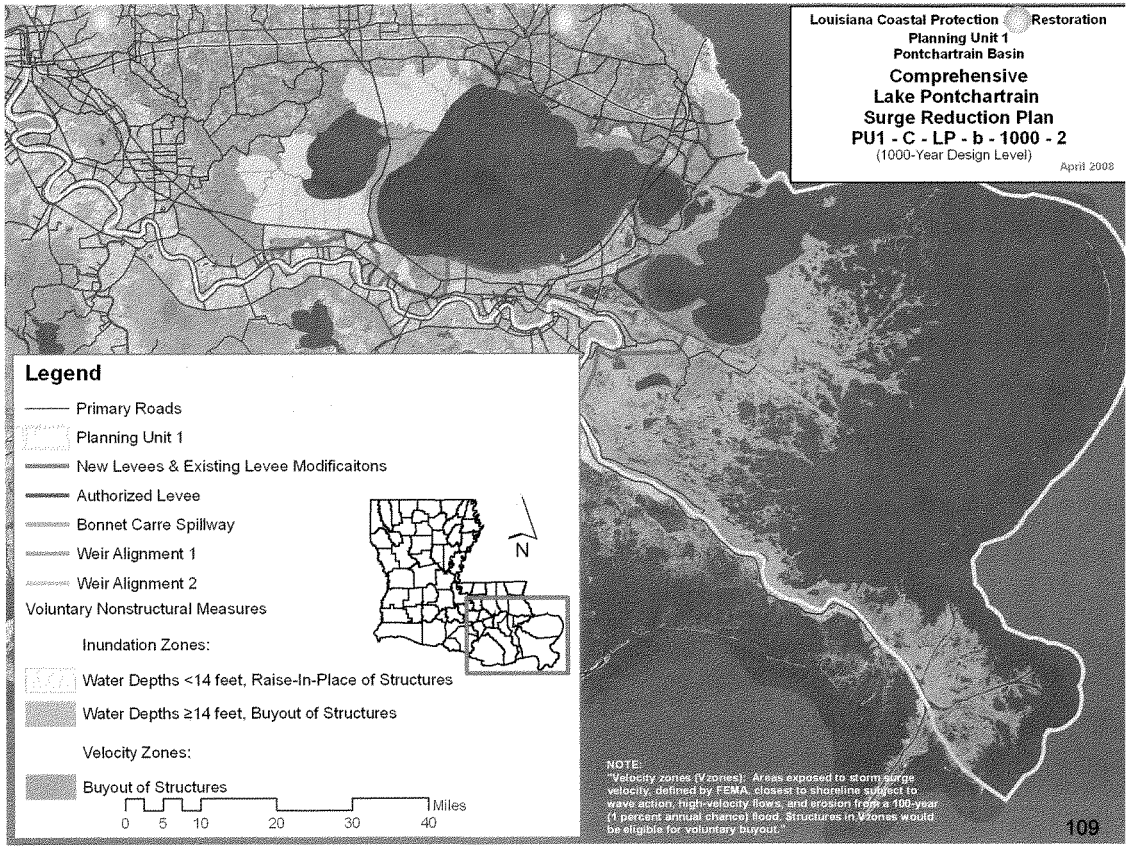
Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	3,754	30,761	280	131	889	36	363	159	52
		Mid		32,697	393	287	1,459	75	333	159	50
		Low		36,596	697	591	2,780	155	303	156	48
2	High RSLR High Employment Dispersed Population	High	3,777	31,242	299	189	1,042	50	363	138	51
		Mid		33,707	446	395	1,763	102	333	135	49
		Low		37,903	878	1,010	3,939	266	303	129	41
3	Low RSLR Business-as-Usual Compact Population	High	3,701	27,765	276	140	964	39	363	159	52
		Mid		29,663	389	268	1,502	71	333	159	50
		Low		33,279	679	495	2,651	134	303	156	48
4	High RSLR Business-as-Usual Compact Population	High	3,724	28,043	293	174	1,075	49	363	138	51
		Mid		30,381	431	323	1,685	88	333	135	49
		Low		34,161	810	852	3,555	222	303	129	41

Other Results			
Construction Time (years)			16
Direct Wetland Impacts (acres)			9,100
Indirect Impacts (unitless)			-8
Spatial Integrity (unitless)			0.42
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)	
	1 / 2	26,099	26,254
	3 / 4	25,737	25,891

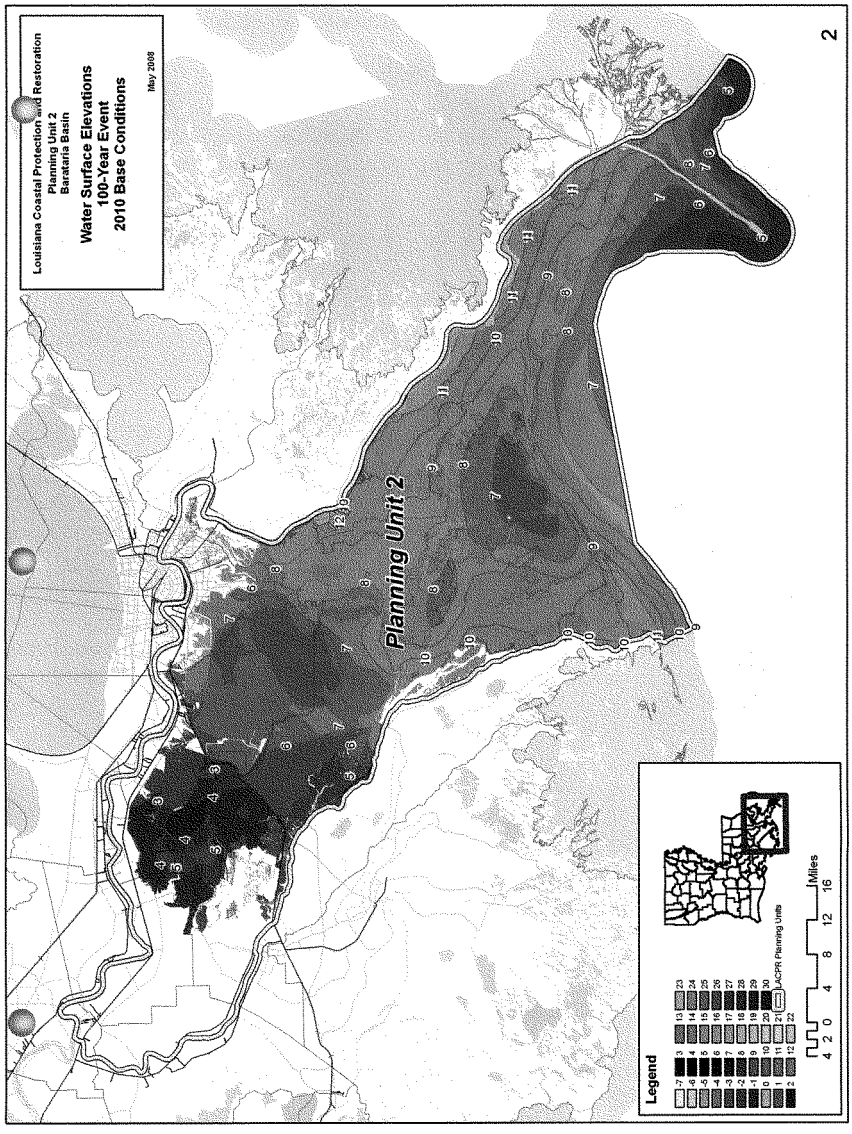
Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
After 50 yrs (% of baseline)	106	104	106	104
After 100 yrs (% of baseline)	104	95	104	95
Present Value of Life Cycle Costs ($ Millions)				
Coastal Component	10,666	10,899	10,666	10,899
Nonstructural Component	3,459	3,459	2,424	2,424
Structural Component	59,398	59,605	59,398	59,605
Total Project	73,523	73,963	72,488	72,929

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 1
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		Comprehensive Plan
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	Lake Pontchartrain Surge Reduction Alt
10-year	1,215	696	1,472	707	1,081	582	1,345	589	
100-year	11,935	931	34,000	968	9,879	807	26,076	832	
400-year	89,937	996	116,204	1,172	62,688	854	80,694	969	
1,000-year	118,260	1,362	122,423	1,933	81,963	1,137	84,515	1,376	1000-year Design
2,000-year	122,343	3,099	125,886	4,018	84,351	2,488	86,336	2,790	

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels.


Louisiana Coastal Protection Restoration
Planning Unit 1
Pontchartrain Basin
Comprehensive
Lake Pontchartrain
Surge Reduction Plan
PU1 - C - LP - b - 1000 - 2
(1000-Year Design Level)
April 2008
Legend
Primary Roads
Planning Unit 1
New Levees & Existing Levee Modificaitons
Authorized Levee
Bonnet Carre Spillway
Weir Alignment 1
Weir Alignment 2
Voluntary Nonstructural Measures
Inundation Zones:
Water Depths <14 feet, Raise-In-Place of Structures
Water Depths ≥14 feet, Buyout of Structures
Velocity Zones:
Buyout of Structures
0 5 10 20 30 40
Miles
N
NOTE:
"Velocity zones (Vzones): Areas exposed to storm surge velocity, defined by FEMA, closest to shoreline subject to wave action, high-velocity flows, and erosion from a 100-year (1 percent annual chance) flood. Structures in Vzones would be eligible for voluntary buyout."
109

Planning Unit 2


Louisiana Coastal Protection and Restoration
Planning Unit 2
Barataria Basin
Water Surface Elevations
100-Year Event
2010 Base Conditions
May 2008
Planning Unit 2
Legend
CPRA Planning Units
Miles
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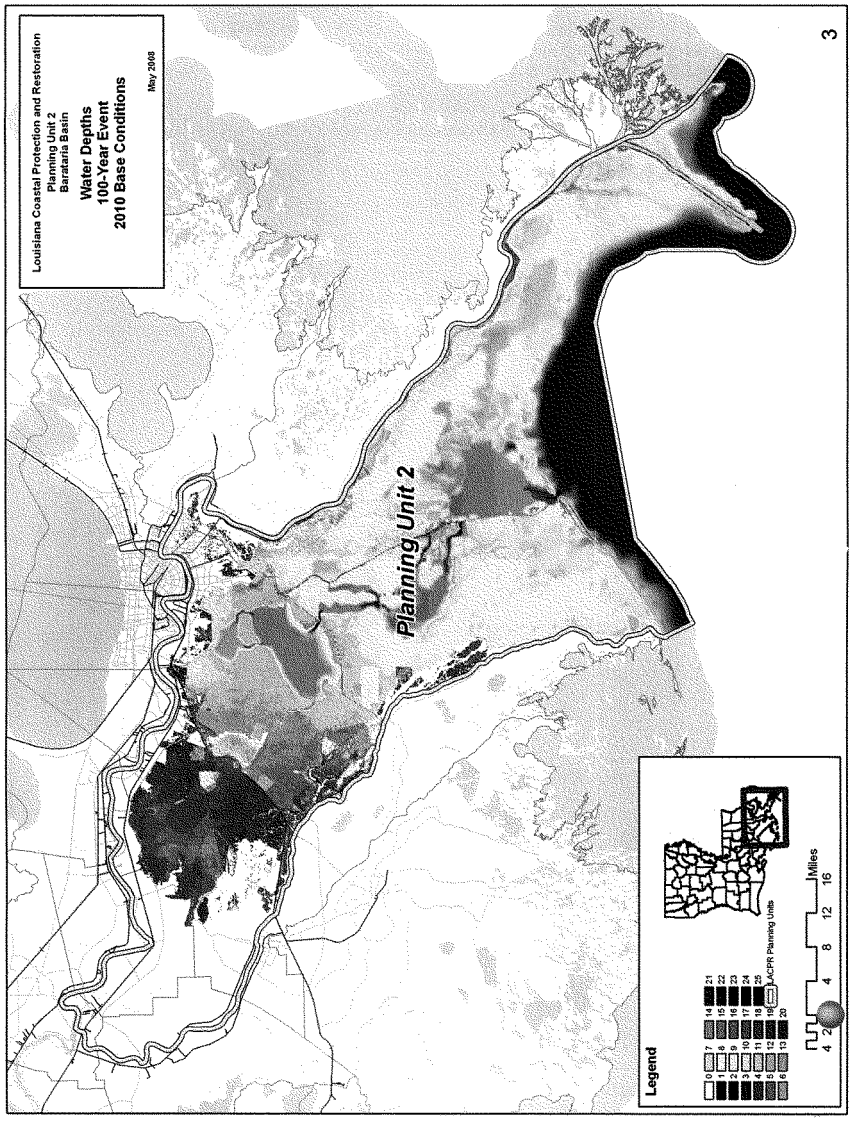
2


Louisiana Coastal Protection and Restoration
Planning Unit 2
Barataria Basin
Water Depths
100-Year Event
2010 Base Conditions
May 2008
Planning Unit 2
Legend
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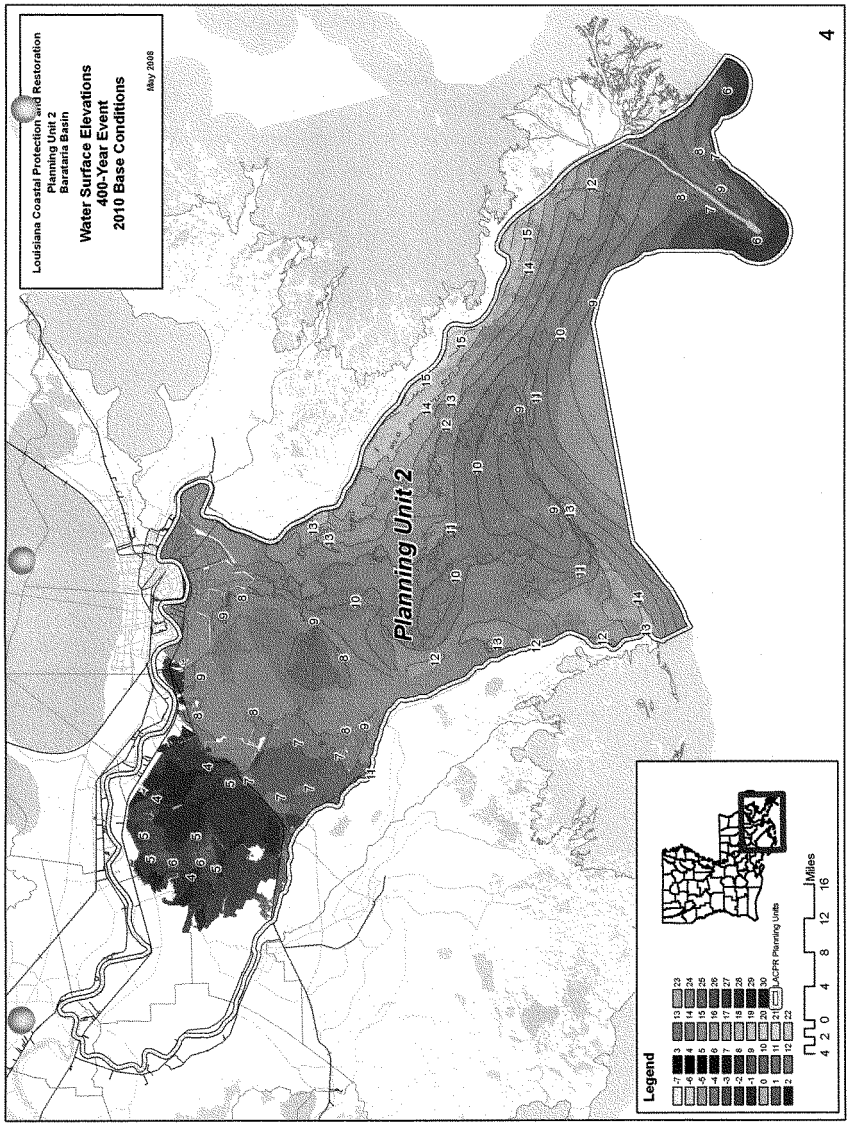
25
LACPR Planning Units
Miles
4 2 0 4 8 12 16
3


Louisiana Coastal Protection and Restoration
Planning Unit 2
Barataria Basin
Water Surface Elevations
400-Year Event
2010 Base Conditions
May 2008
Planning Unit 2
Legend
JCFP Planning Units
Miles
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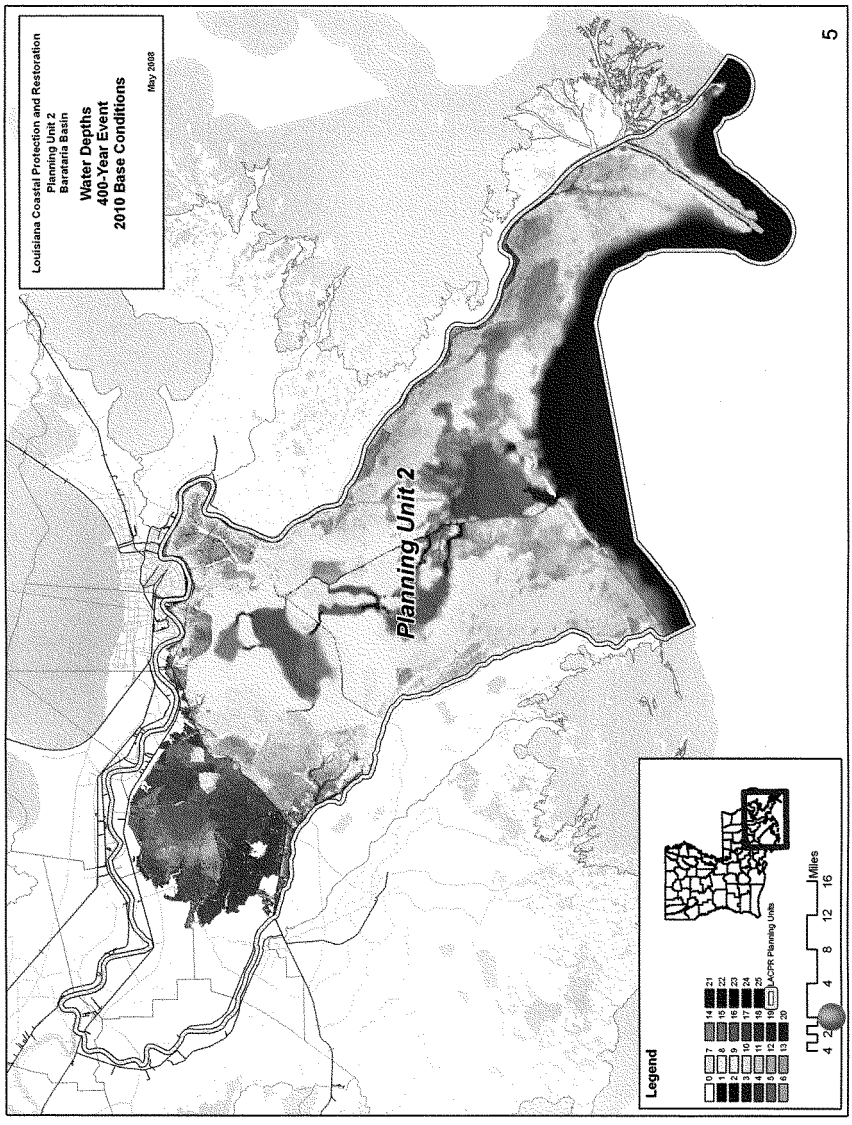
4


Louisiana Coastal Protection and Restoration
Planning Unit 2
Barataria Basin
Water Depths
400-Year Event
2010 Base Conditions
May 2008
Planning Unit 2
Legend
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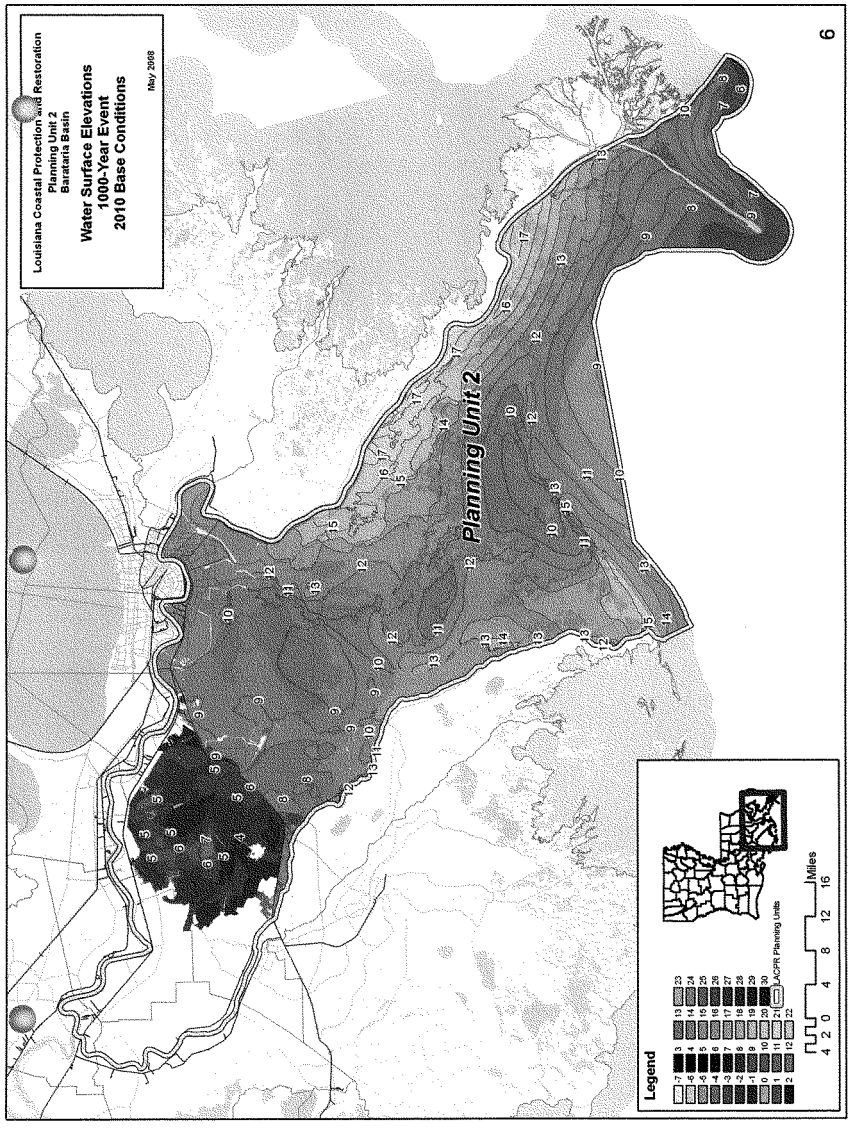
LACPR Planning Units
Miles
4 2 0 4 8 12 16
5


Louisiana Coastal Protection and Restoration
Planning Unit 2
Barataria Basin
Water Surface Elevations
100-Year Event
2010 Base Conditions
May 2008
Planning Unit 2
Legend
Miles
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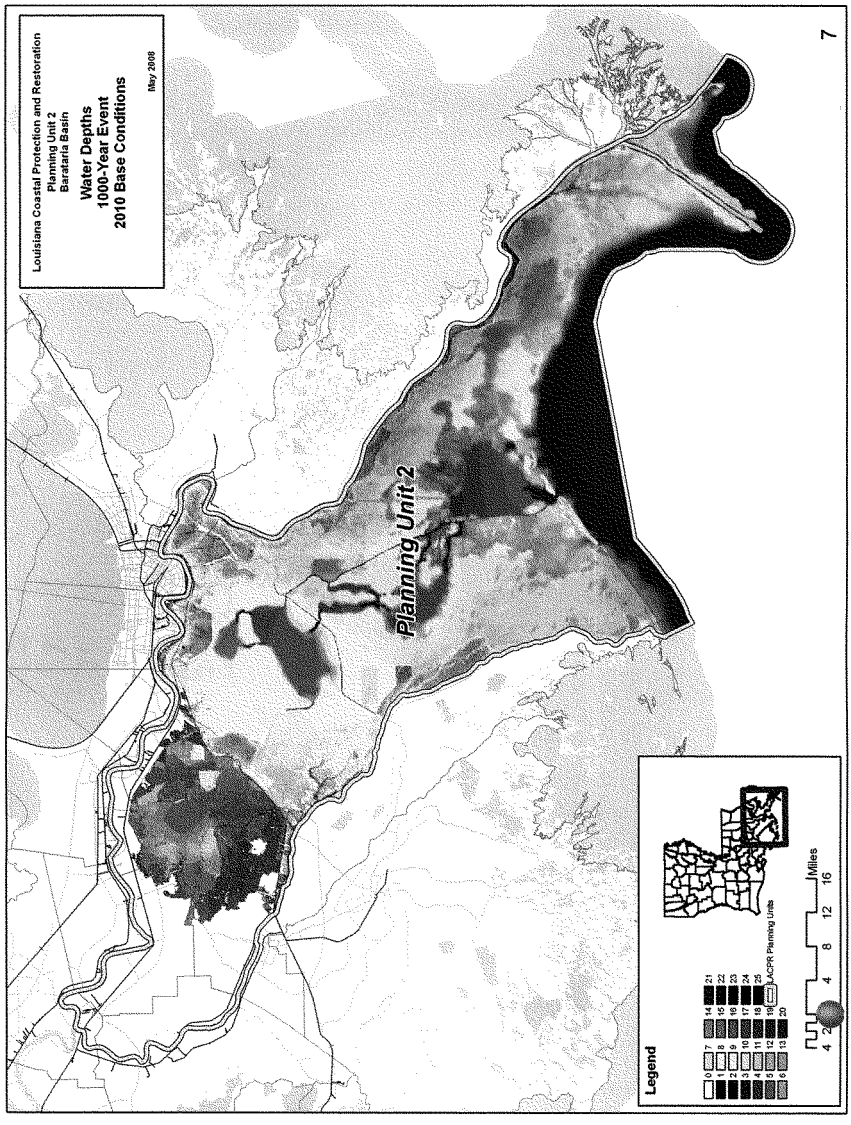
6


Louisiana Coastal Protection and Restoration
Planning Unit 2
Barataria Basin
Water Depths
1000-Year Event
2010 Base Conditions
May 2008
Planning Unit 2
Legend
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LACPR Planning Units
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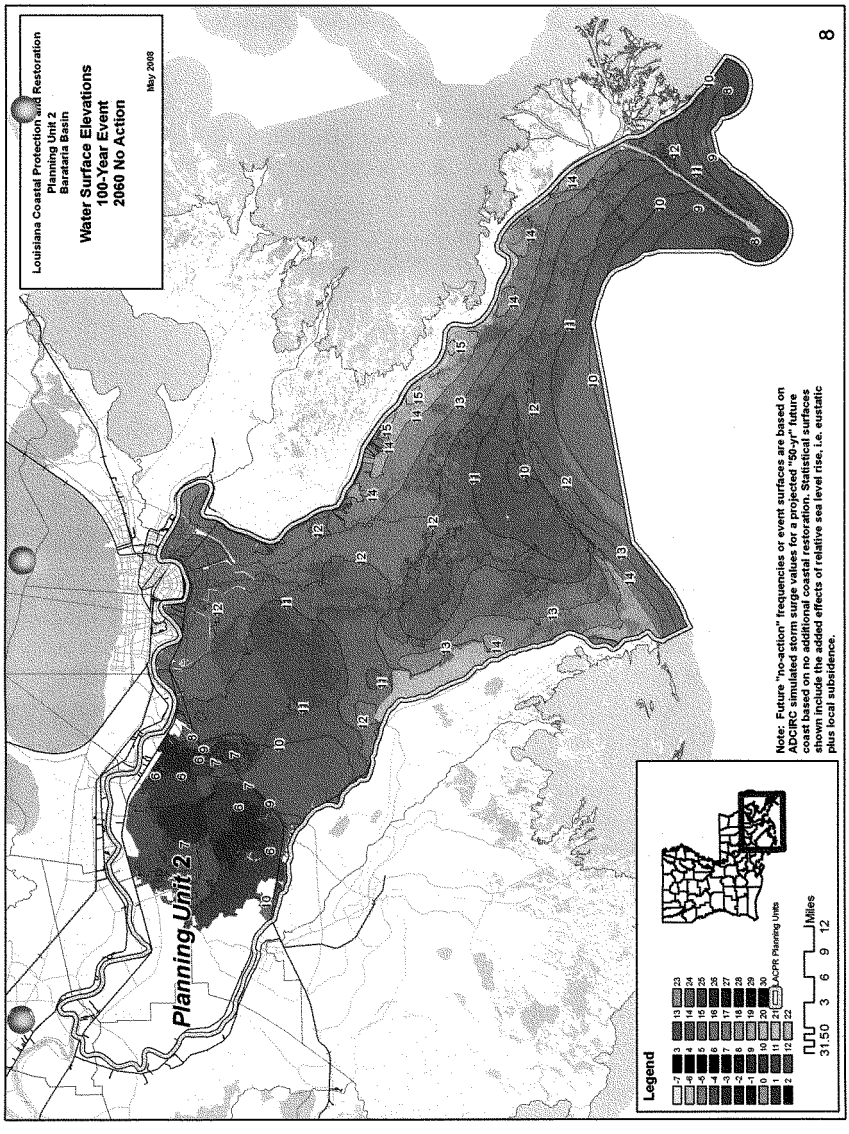
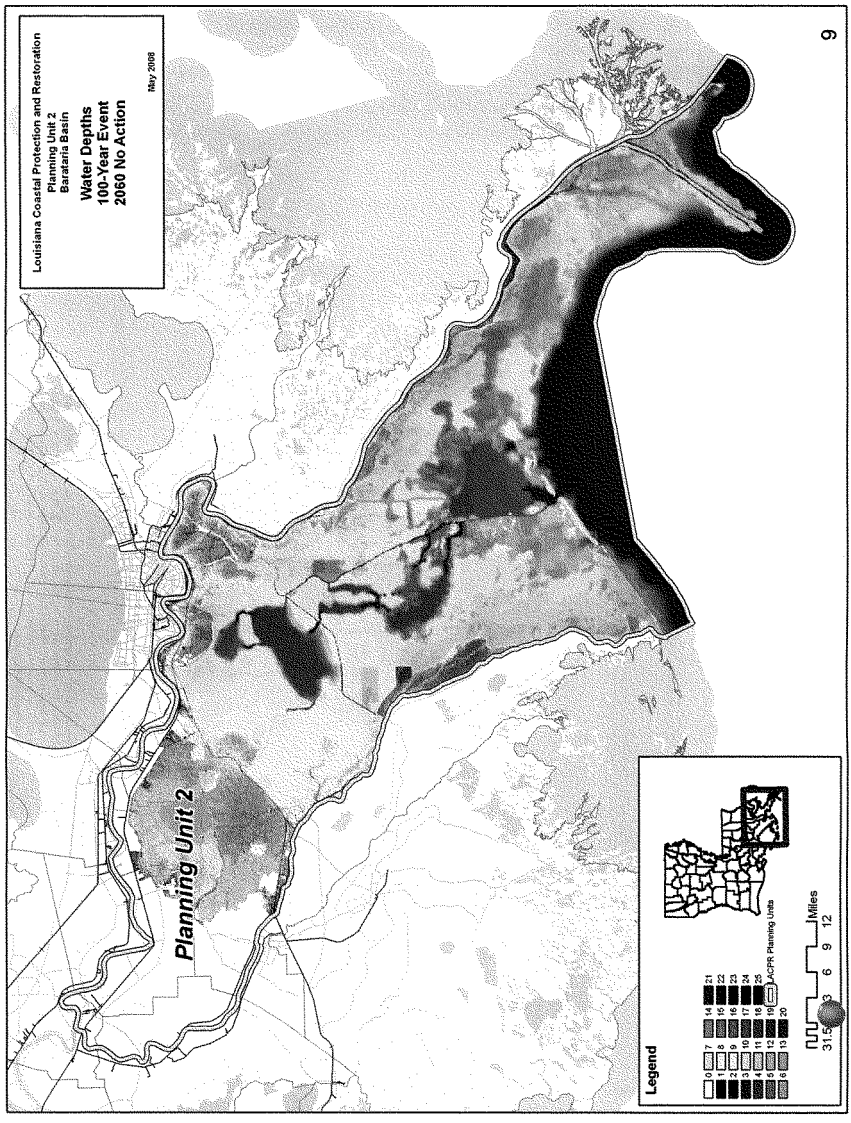
Miles
7


Louisiana Coastal Protection and Restoration
Planning Unit 2
Barataria Basin
Water Surface Elevations
100-Year Event
2060 No Action
May 2008
Planning Unit 2
Legend
JCPR Planning Units
Miles
0 3 6 9 12
Note: Future "no-action" frequencies or event surfaces are based on ADCIRC simulated storm surge values for a projected "50-yr" future coast based on no additional coastal restoration. Statistical surfaces were then created from the added effects of relative sea level rise, i.e. eustatic plus local subsidence.
8


Louisiana Coastal Protection and Restoration
Planning Unit 2
Barataria Basin
Water Depths
100-Year Event
2060 No Action
May 2008
Planning Unit 2
Legend
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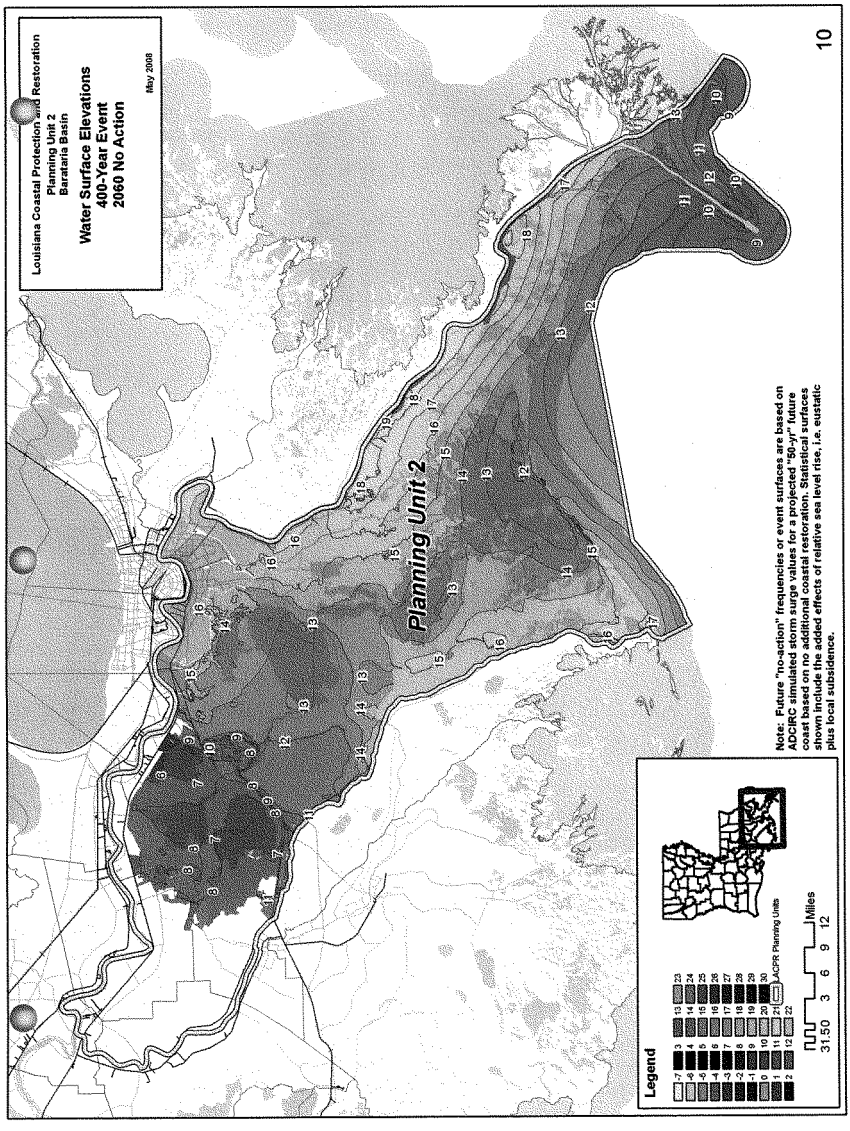
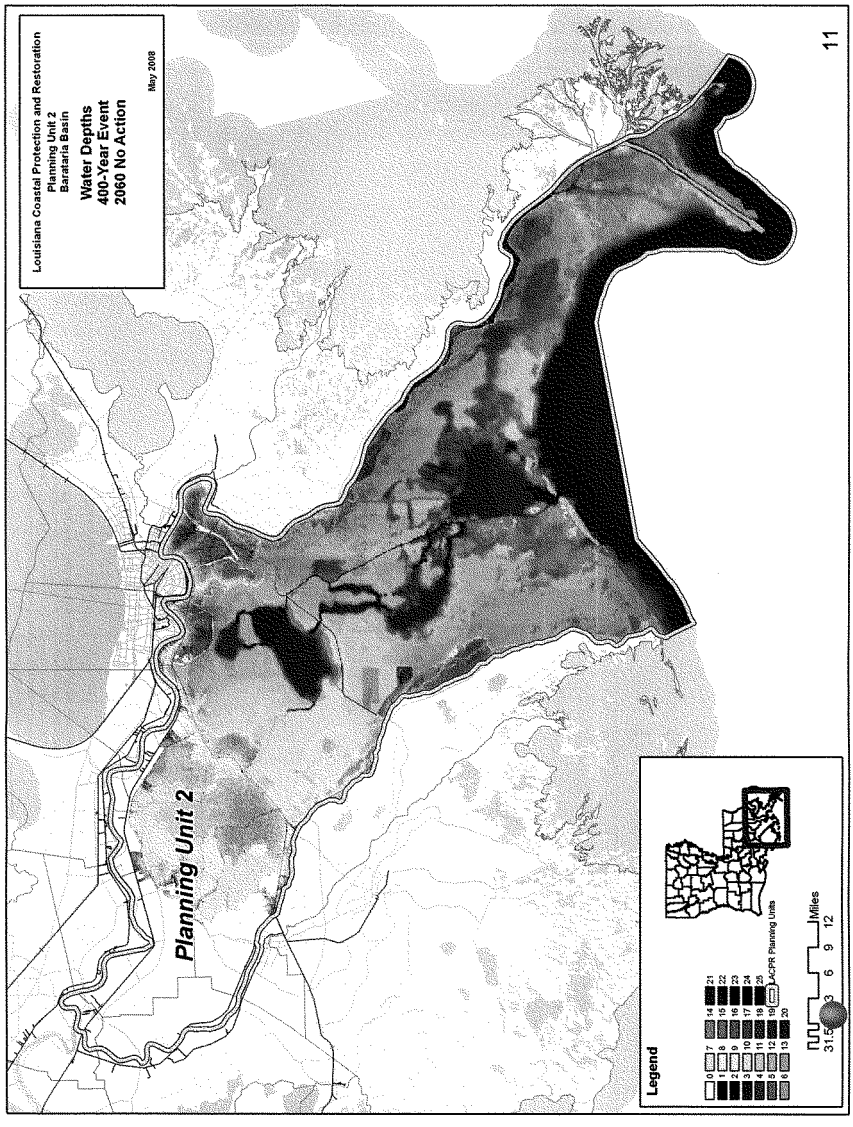
LACPR Planning Units
Miles
0 3 6 9 12
31.5
9


Louisiana Coastal Protection and Restoration
Planning Unit 2
Barataria Basin
Water Surface Elevations
400-Year Event
2060 No Action
May 2008
Planning Unit 2
Legend
CPR Planning Units
Miles
0 3 6 9 12
Note: Future "no-action" frequencies or event surfaces are based on ADCIRC simulated storm surge values for a projected "50-yr" future coast based on no additional coastal restoration. Statistical surfaces shown include the added effects of relative sea level rise, i.e. eustatic plus local subsidence.
10


Louisiana Coastal Protection and Restoration
Planning Unit 2
Barataria Basin
Water Depths
400-Year Event
2060 No Action
May 2008
Planning Unit 2
Legend
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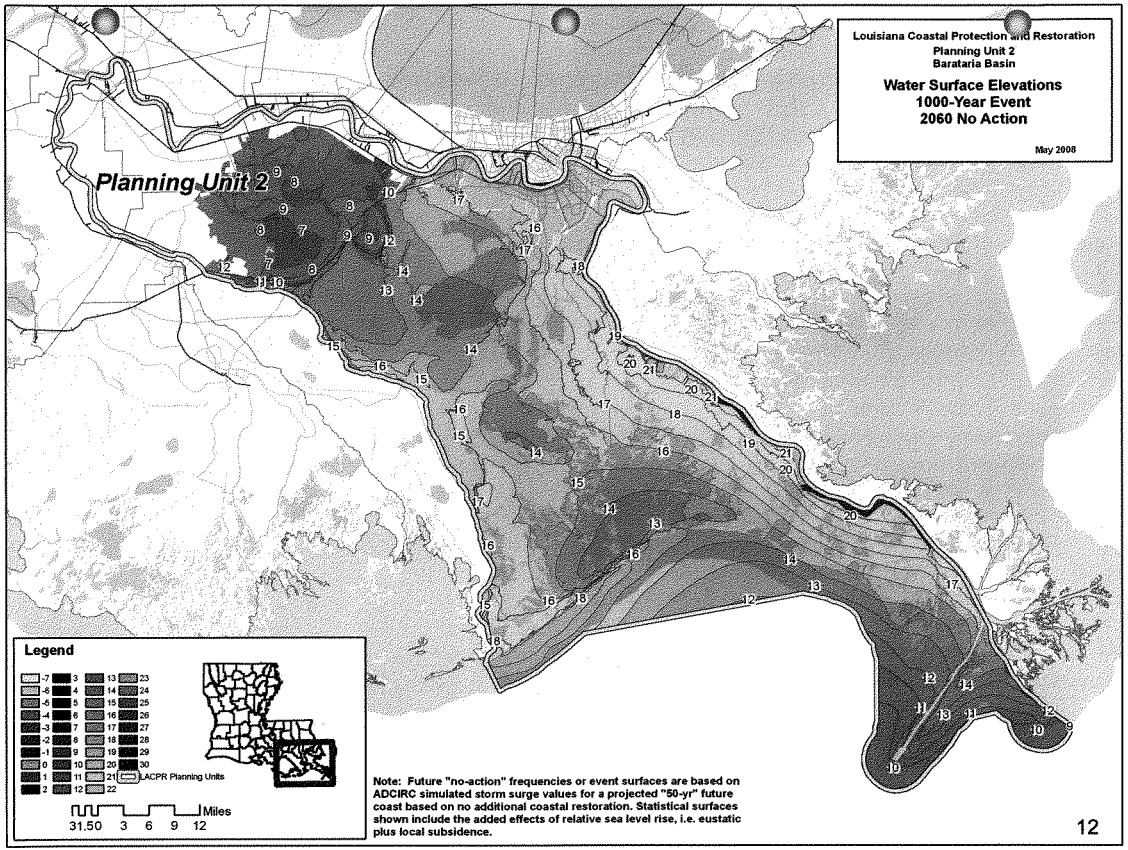
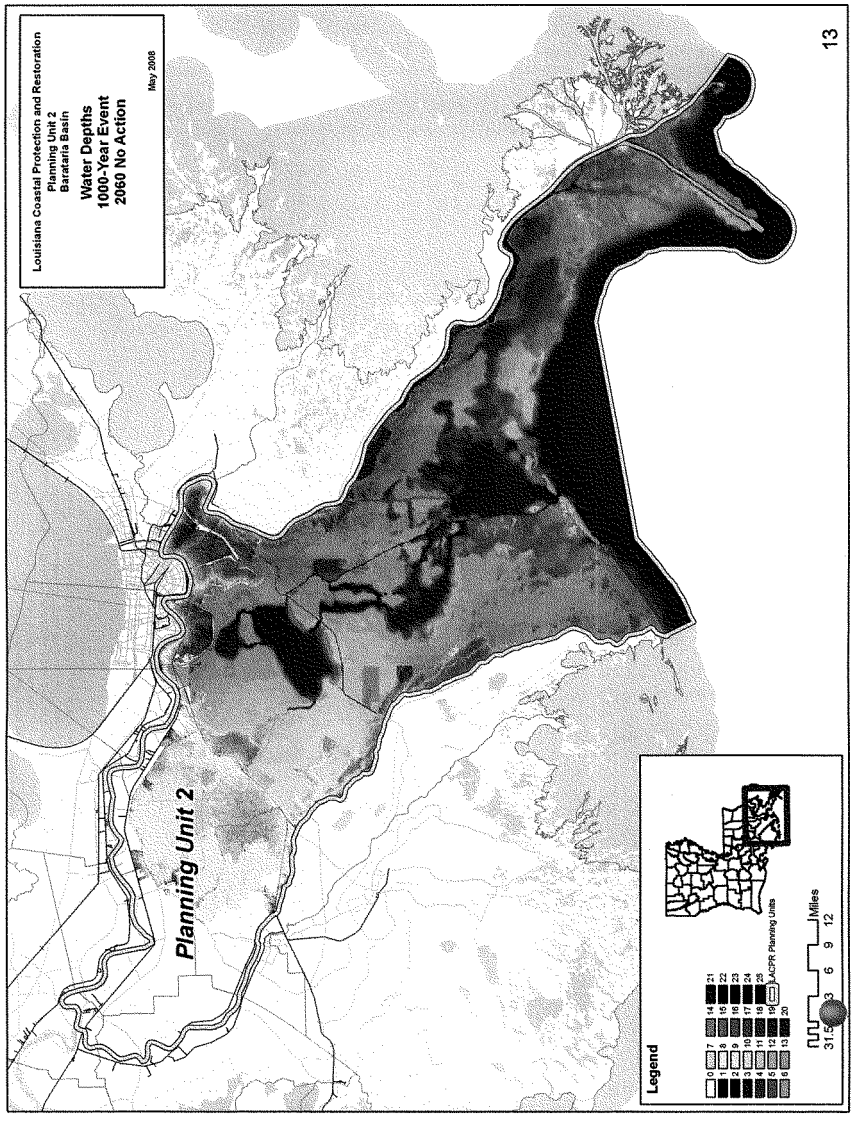
LACPR Planning Units
Miles
3 6 9 12
11


Louisiana Coastal Protection and Restoration
Planning Unit 2
Barataria Basin
Water Surface Elevations
1000-Year Event
2060 No Action
May 2008
Planning Unit 2
Legend
LACPR Planning Units
Miles
31,50 3 6 9 12
Note: Future "no-action" frequencies or event surfaces are based on ADCIRC simulated storm surge values for a projected "50-yr" future coast based on no additional coastal restoration. Statistical surfaces shown include the added effects of relative sea level rise, i.e. eustatic plus local subsidence.
12


Louisiana Coastal Protection and Restoration
Planning Unit 2
Barataria Basin
Water Depths
1000-Year Event
2060 No Action
May 2008
Planning Unit 2
Legend
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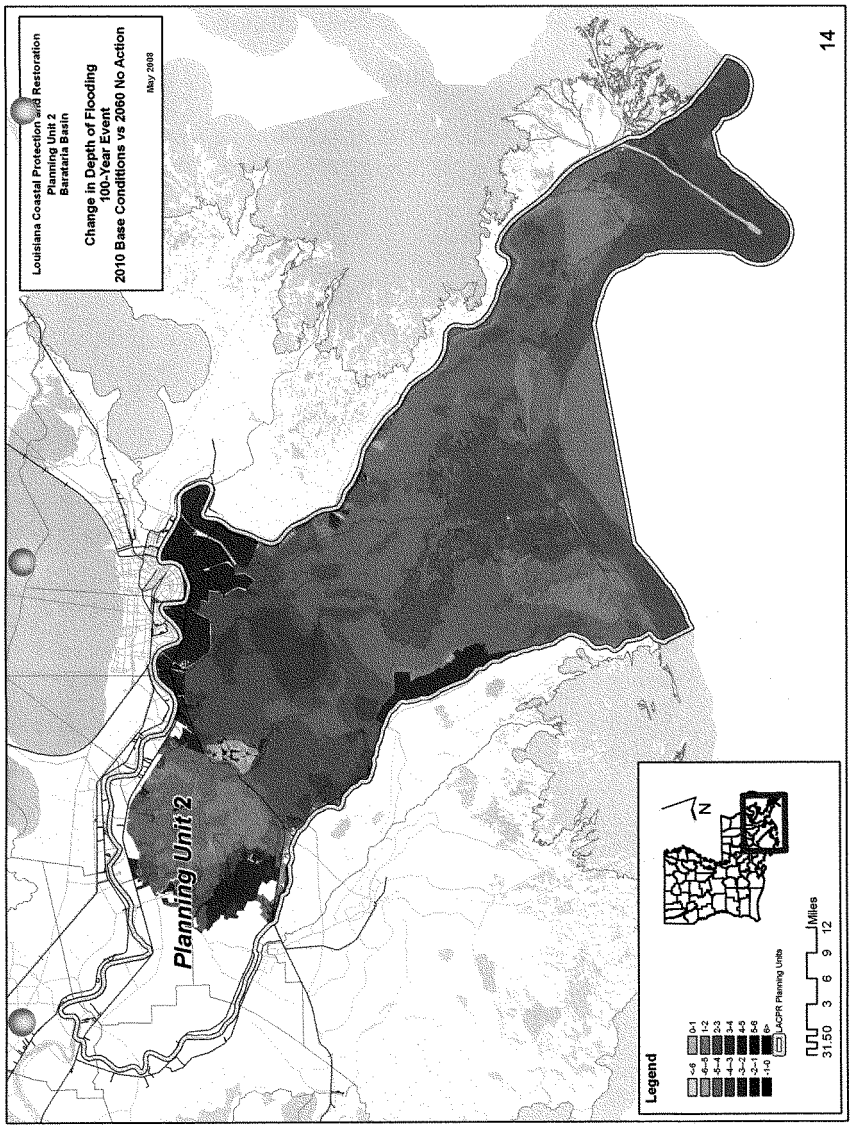
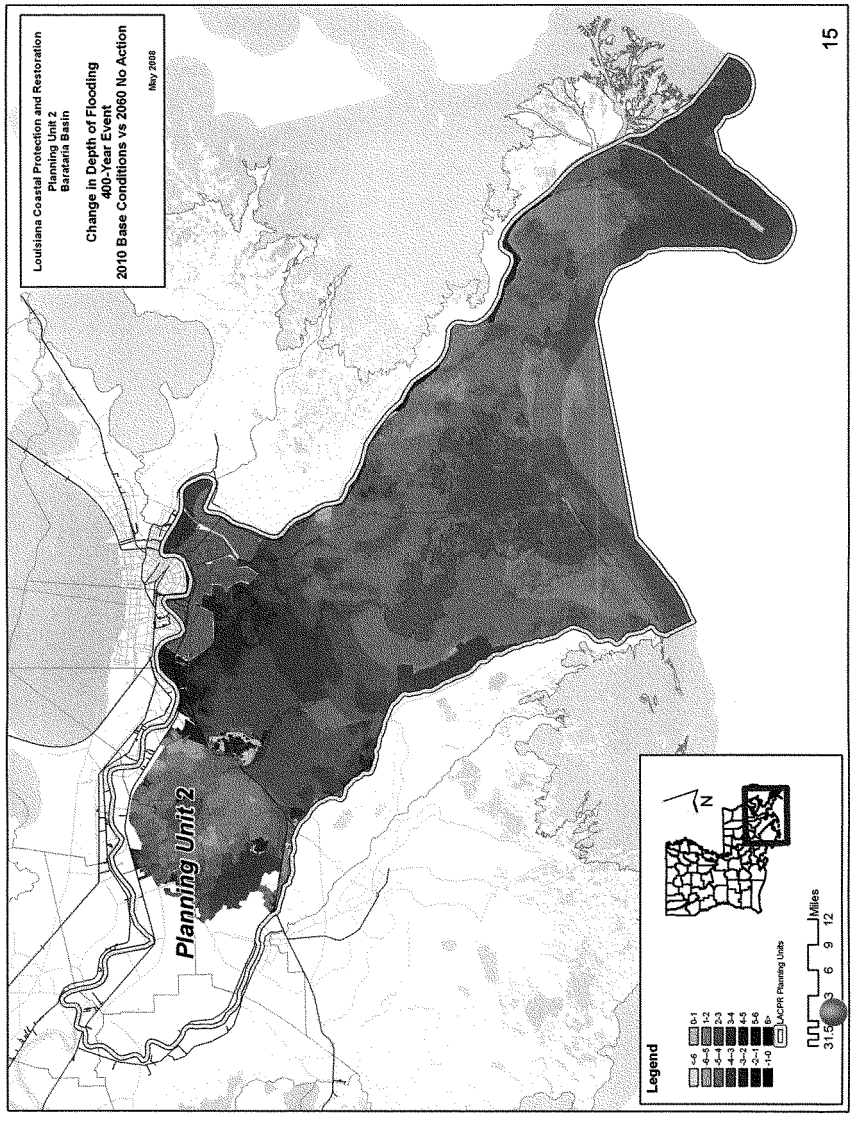
25
LACPR Planning Units
Miles
0 3 6 9 12
13


Louisiana Coastal Protection and Restoration
Planning Unit 2
Barataria Basin
Change in Depth of Flooding
100-Year Event
2010 Base Conditions vs 2060 No Action
May 2008
Planning Unit 2
Legend
>6
6-5
5-4
4-3
3-2
2-1
1-0
0-1
1-2
2-3
3-4
4-5
5-6
6>
LACPR Planning Units
Miles
3 0 3 6 9 12
14


Louisiana Coastal Protection and Restoration
Planning Unit 2
Barataria Basin
Change in Depth of Flooding
400-Year Event
2010 Base Conditions vs 2060 No Action
May 2008
Planning Unit 2
Legend
-6
-5
-4
-3
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-1
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0-1
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4-5
5-6
6+
CPR Planning Units
Miles
3 6 9 12
31.5
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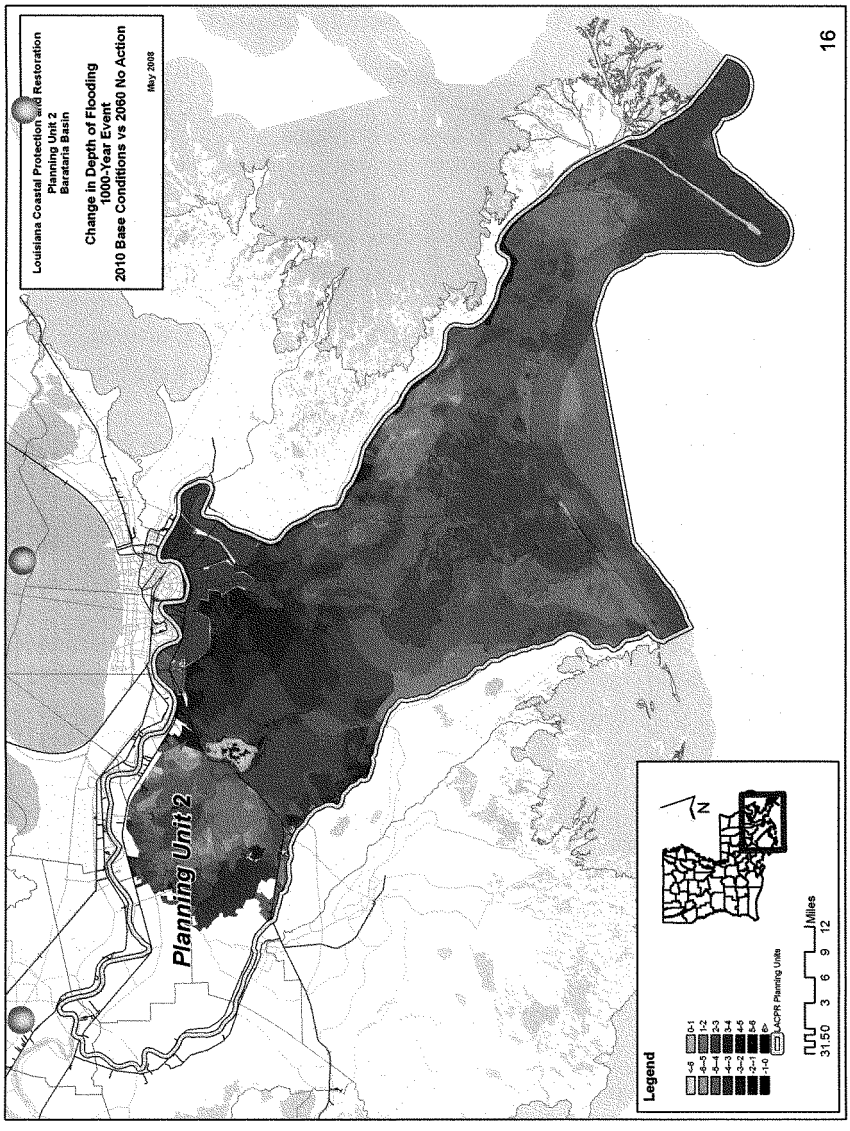
15


Louisiana Coastal Protection and Restoration
Planning Unit 2
Barataria Basin
Change in Depth of Flooding
1000-Year Event
2010 Base Conditions vs 2060 No Action
May 2008
Planning Unit 2
Legend
>5
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4-3
3-2
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2-3
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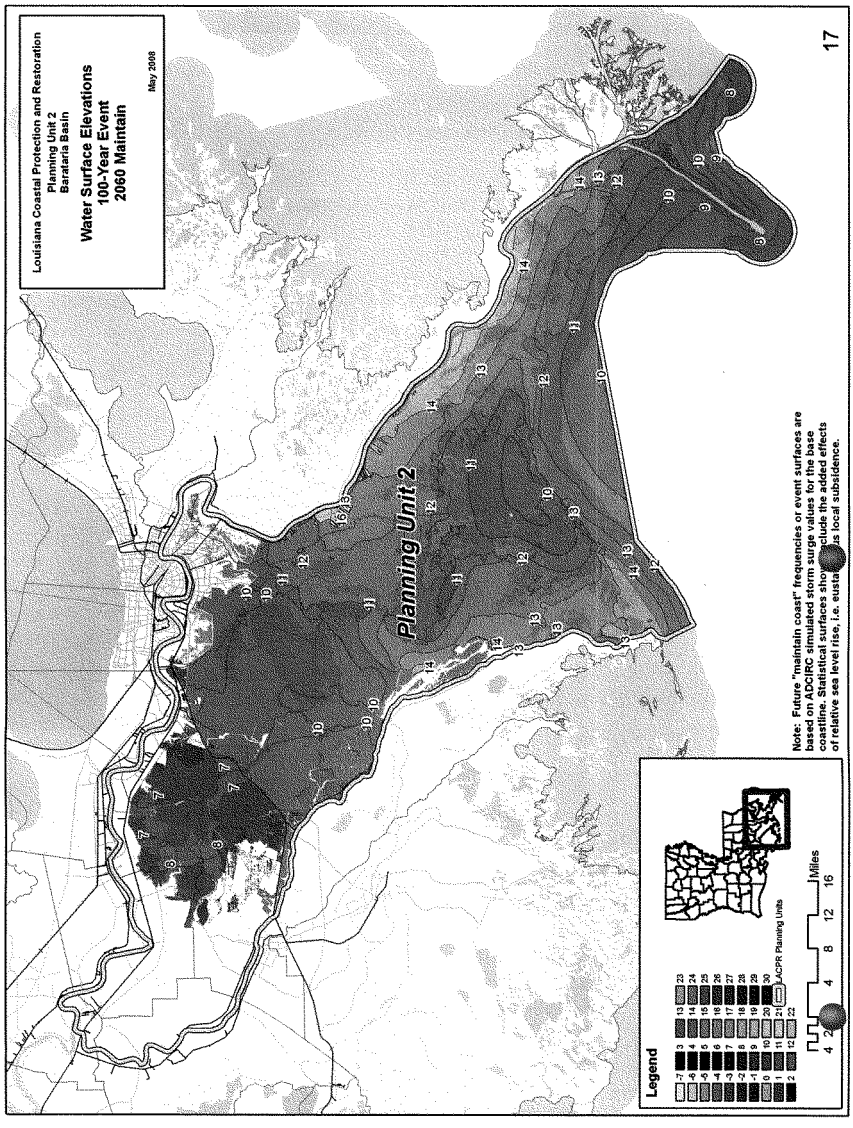
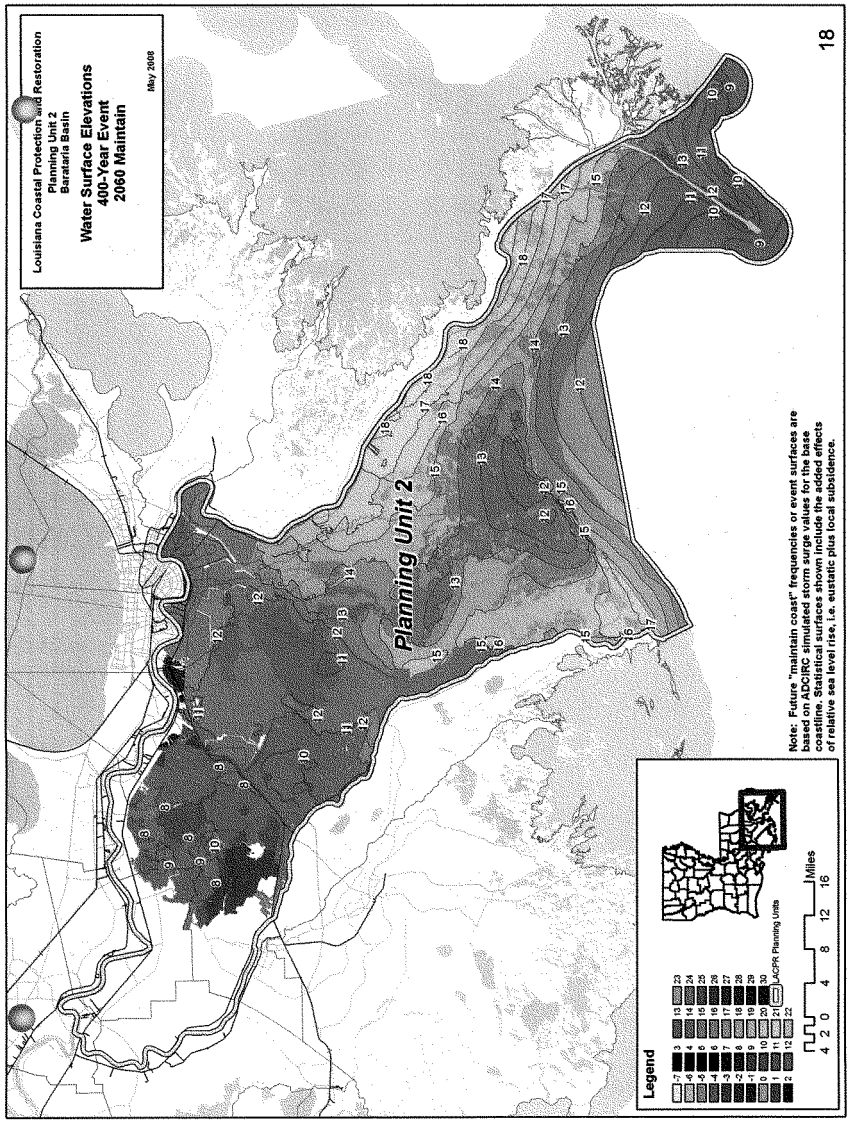
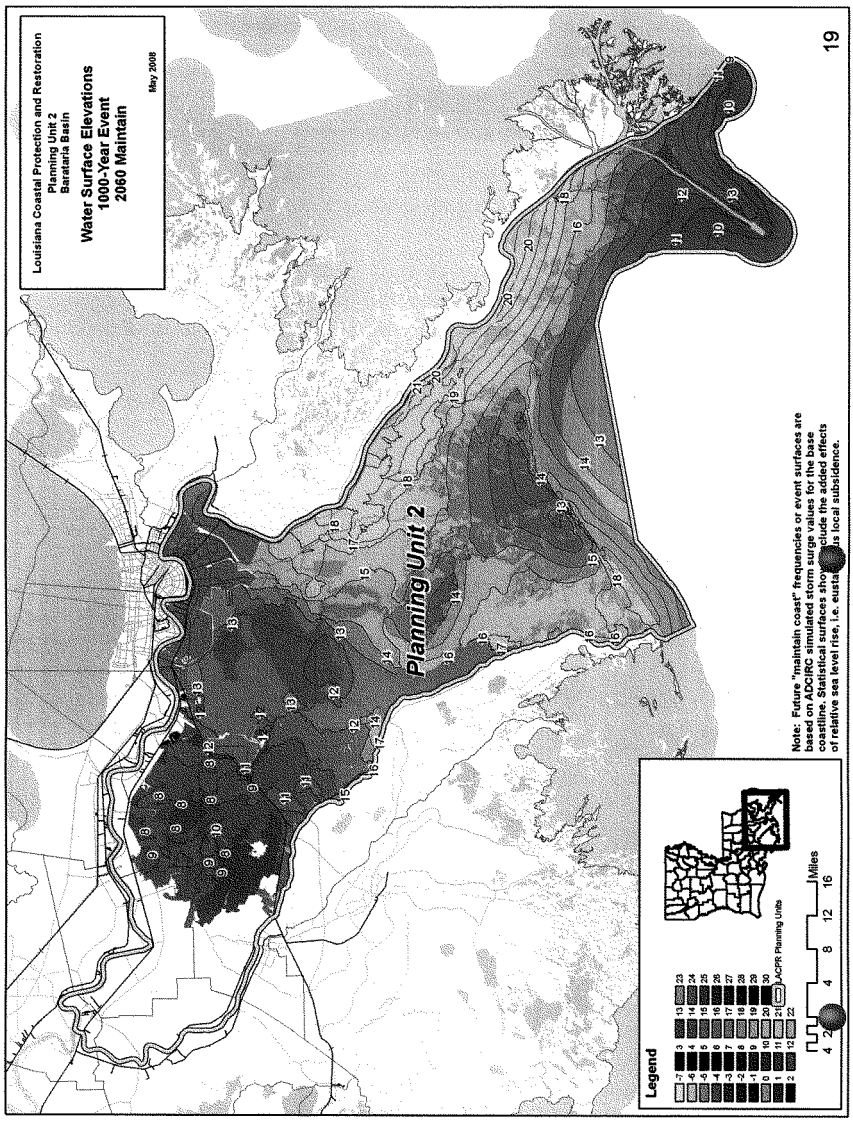
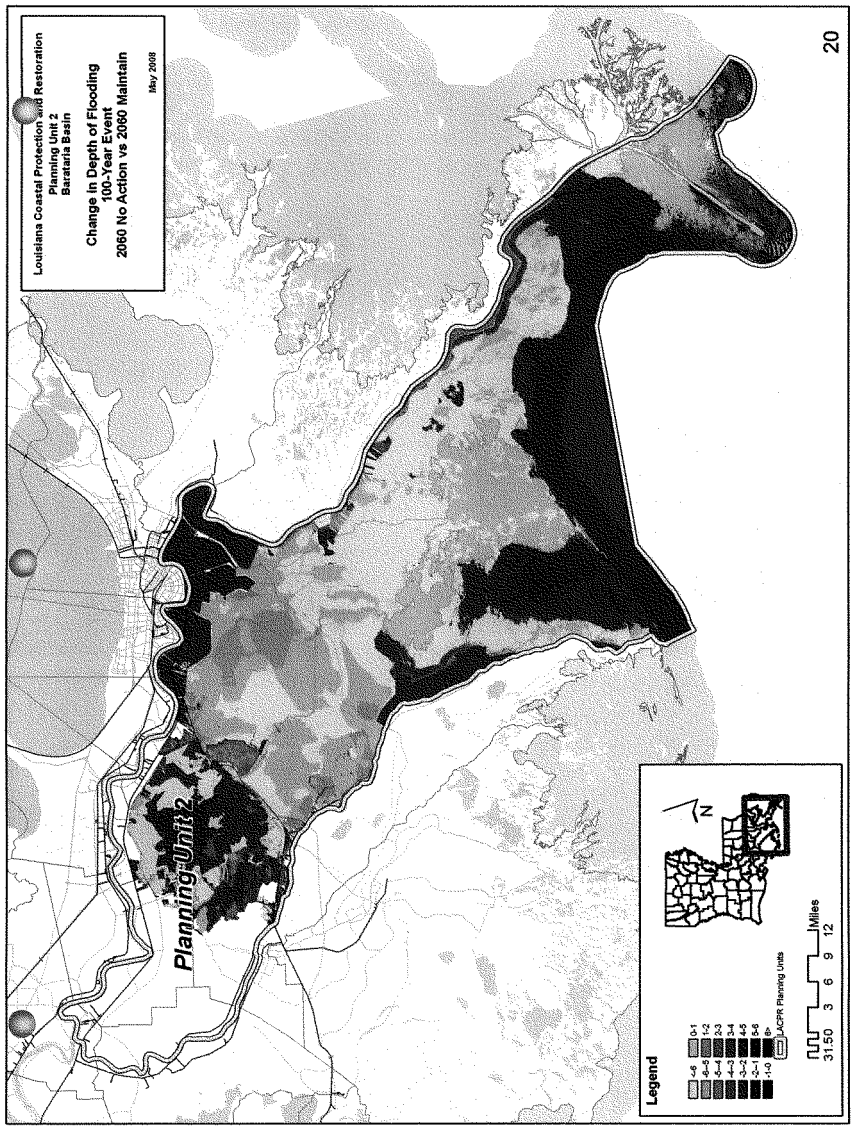
4-5
5-6
6>
LACPR Planning Units
N
Miles
3 1.5 0 3 6 9 12
16


Louisiana Coastal Protection and Restoration
Planning Unit 2
Barataria Basin
Water Surface Elevations
100-Year Event
2060 Maintain
May 2008
Planning Unit 2
Legend
CPR Planning Units
Miles
Note: Future "maintain coast" frequencies or event surfaces are based on ADCIRC simulated storm surge values for the base coastline. Statistical surfaces shown include the added effects of relative sea level rise, i.e. eustatic and local subsidence.
17


Louisiana Coastal Protection and Restoration
Planning Unit 2
Barataria Basin
Water Surface Elevations
400-Year Event
2060 Maintain
May 2008
Planning Unit 2
Legend
LACPR Planning Units
Miles
Note: Future "maintain coast" frequencies or event surfaces are based on ADCIRC simulated storm surge values for the base coastline. Statistical surfaces shown include the added effects of relative sea level rise, i.e. eustatic plus local subsidence.
18


Louisiana Coastal Protection and Restoration
Planning Unit 2
Barataria Basin
Water Surface Elevations
1000-Year Event
2060 Maintain
May 2008
Planning Unit 2
Legend
CPR Planning Units
Miles
Note: Future "maintain coast" frequencies or event surfaces are based on ADCIRC simulated storm surge values for the base coastline. Statistical surfaces shown include the added effects of relative sea level rise, i.e. eustatic plus local subsidence.
19


Louisiana Coastal Protection and Restoration
Planning Unit 2
Barataria Basin
Change in Depth of Flooding
100-Year Event
2060 No Action vs 2060 Maintain
May 2008
Planning Unit 2
Legend
-6-5
-5-4
-4-3
-3-2
-2-1
-1-0
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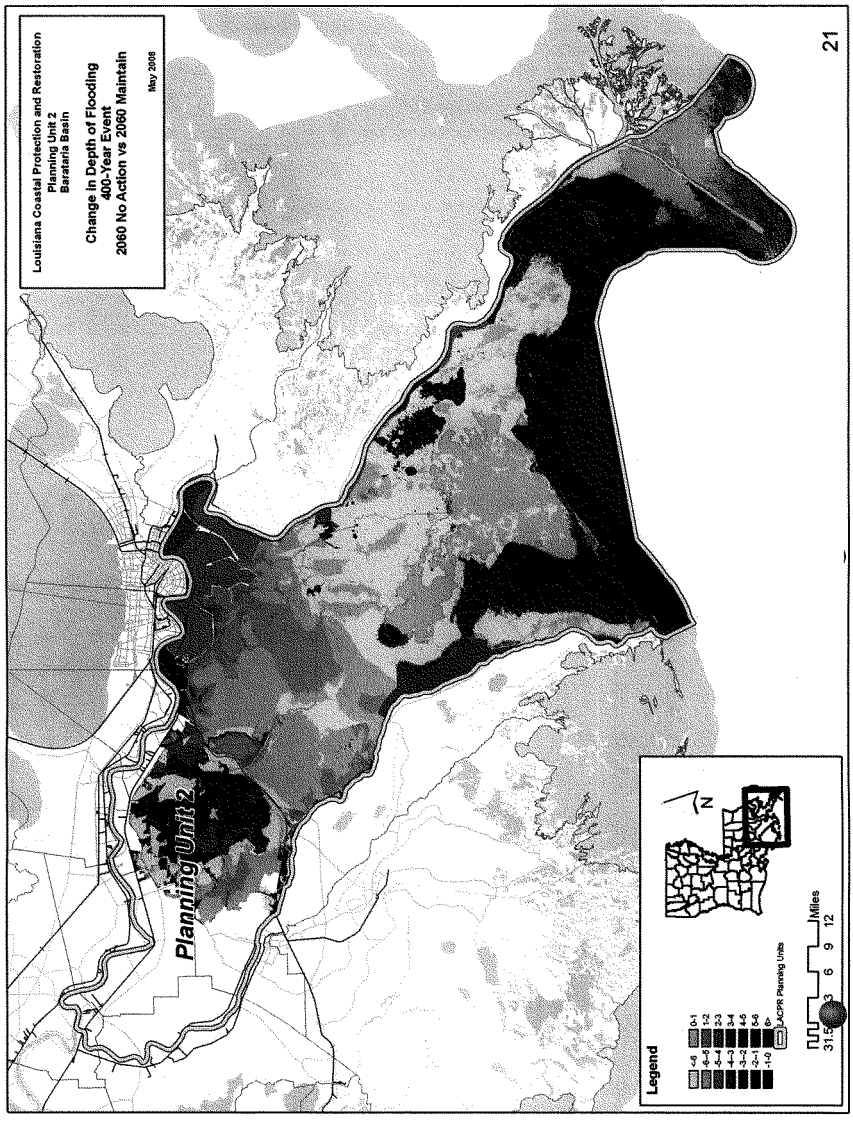
4-5
5-6
6+
LACPR Planning Units
Miles
0 1.5 3 6 9 12
N
20


Louisiana Coastal Protection and Restoration
Planning Unit 2
Barataria Basin
Change in Depth of Flooding
400-Year Event
2060 No Action vs 2060 Maintain
May 2008
Planning Unit 2
Legend
<-5
-5--4
-4--3
-3--2
-2--1
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2-3
3-4
4-5
5-6
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CPR Planning Units
Miles
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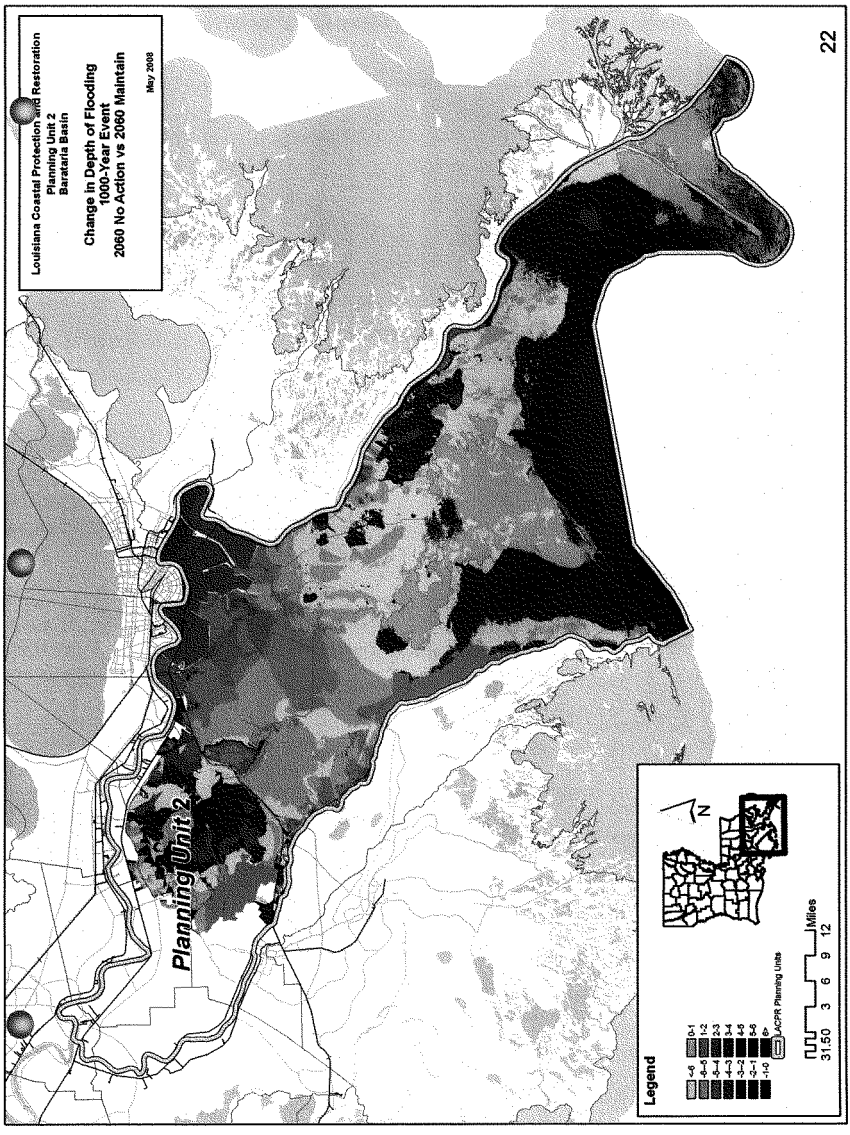
N
21


Louisiana Coastal Protection and Restoration
Planning Unit 2
Barataria Basin
Change in Depth of Flooding
1000-Year Event
2060 No Action vs 2060 Maintain
May 2008
Planning Unit 2
Legend
<-6
-6-5
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-4-3
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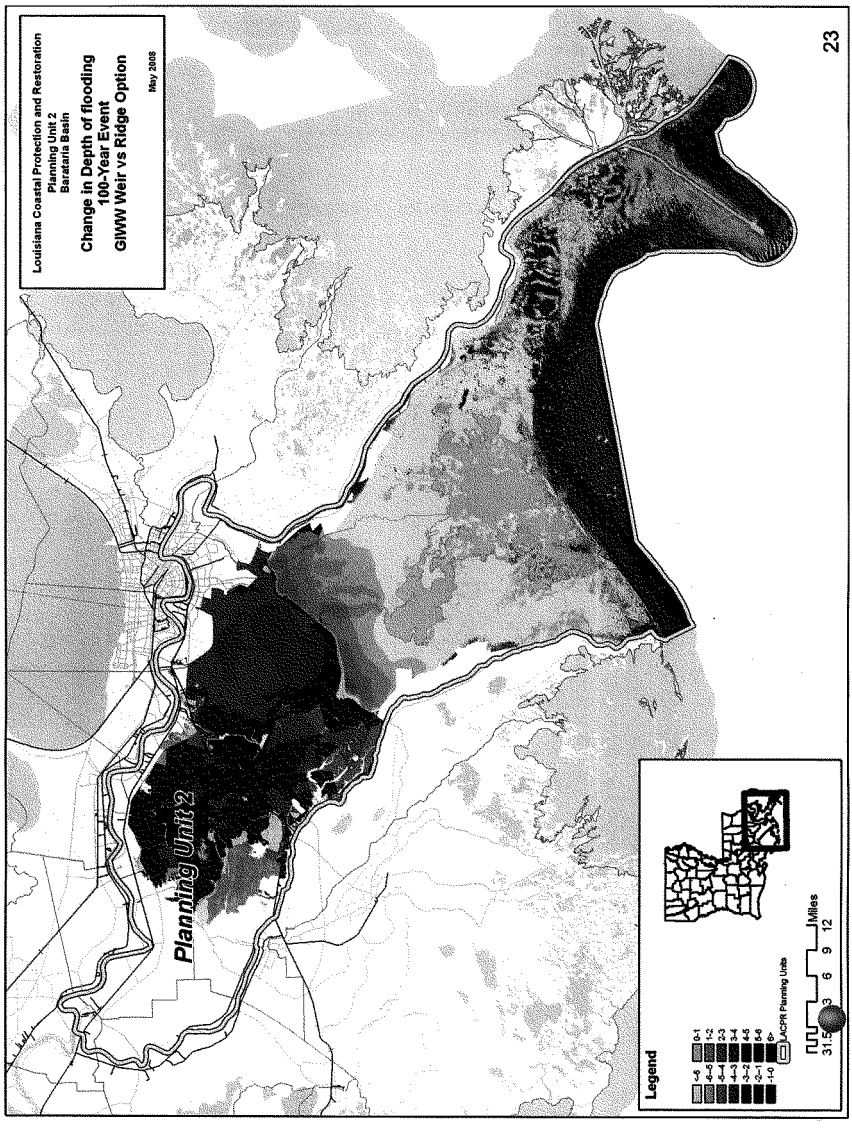
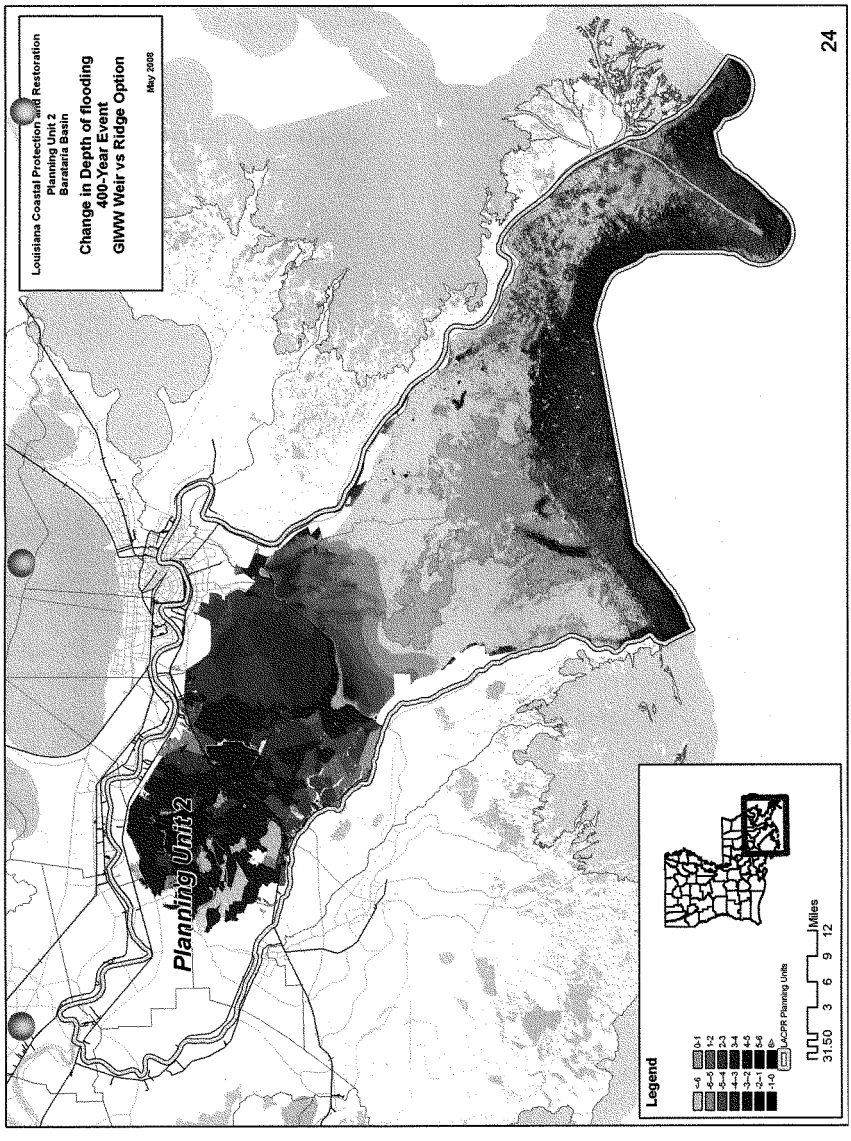
6>
LACPR Planning Units
N
Miles
31.50 3 6 9 12
22


Louisiana Coastal Protection and Restoration
Planning Unit 2
Barataria Basin
Change in Depth of flooding
100-Year Event
GIWW Weir vs Ridge Option
May 2008
Planning Unit 2
Legend
LACPR Planning Units
Miles
23


Louisiana Coastal Protection and Restoration
Planning Unit 2
Barataria Basin
Change in Depth of flooding
400-Year Event
GIWW Weir vs Ridge Option
May 2008
Planning Unit 2
Legend
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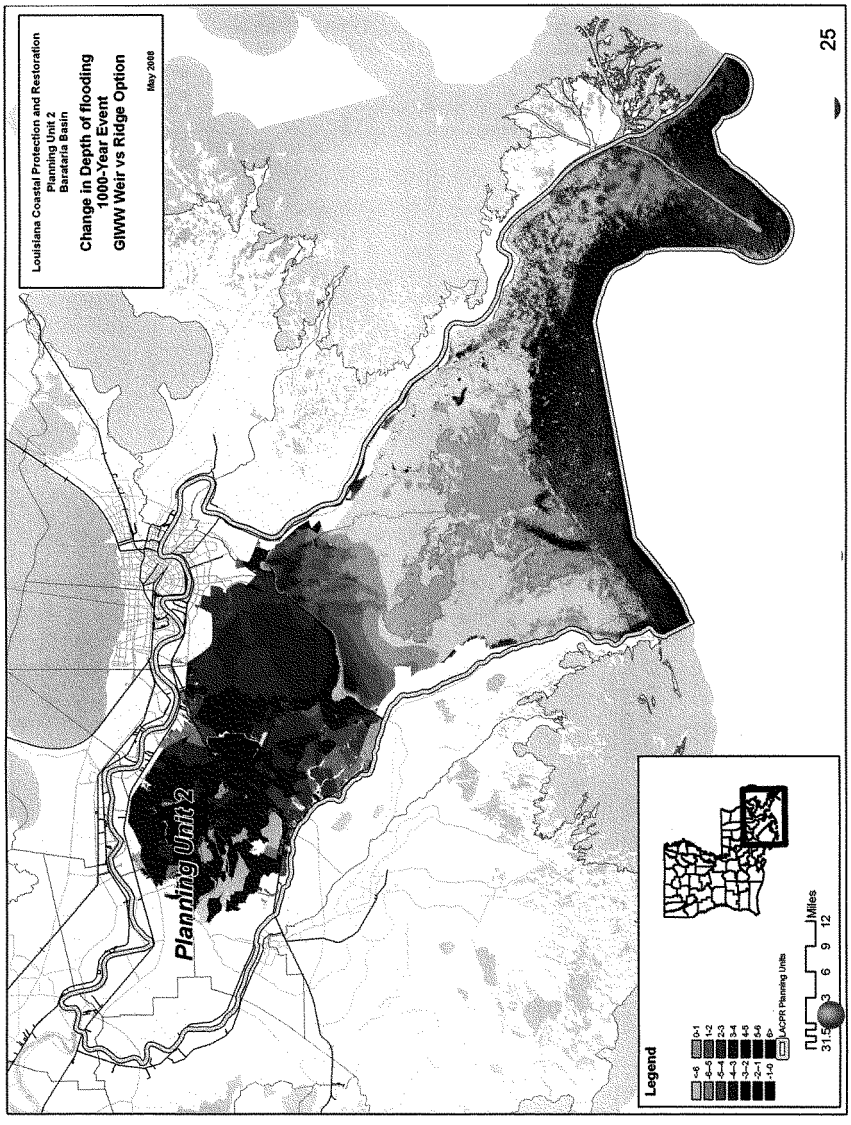
ACPR Planning Units
Miles
0 1.5 3 6 9 12
24


Louisiana Coastal Protection and Restoration
Planning Unit 2
Barataria Basin
Change in Depth of flooding
1000-Year Event
GIWW Weir vs Ridge Option
May 2008
Planning Unit 2
Legend
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-3--2
-4--3
-5--4
-6--5
<-6
LACPR Planning Units
Miles
3 6 9 12
31.5
25

Planning Unit:	2	Alt. No.:	2-0	Category:	No Action
Alternative Description:	No action (without project) alternative.				
Coastal Component:	Degraded coast--increasing risk.		Nonstructural Component:		None
Structural Component:	No new levees or increases in risk reduction level for existing levees.				

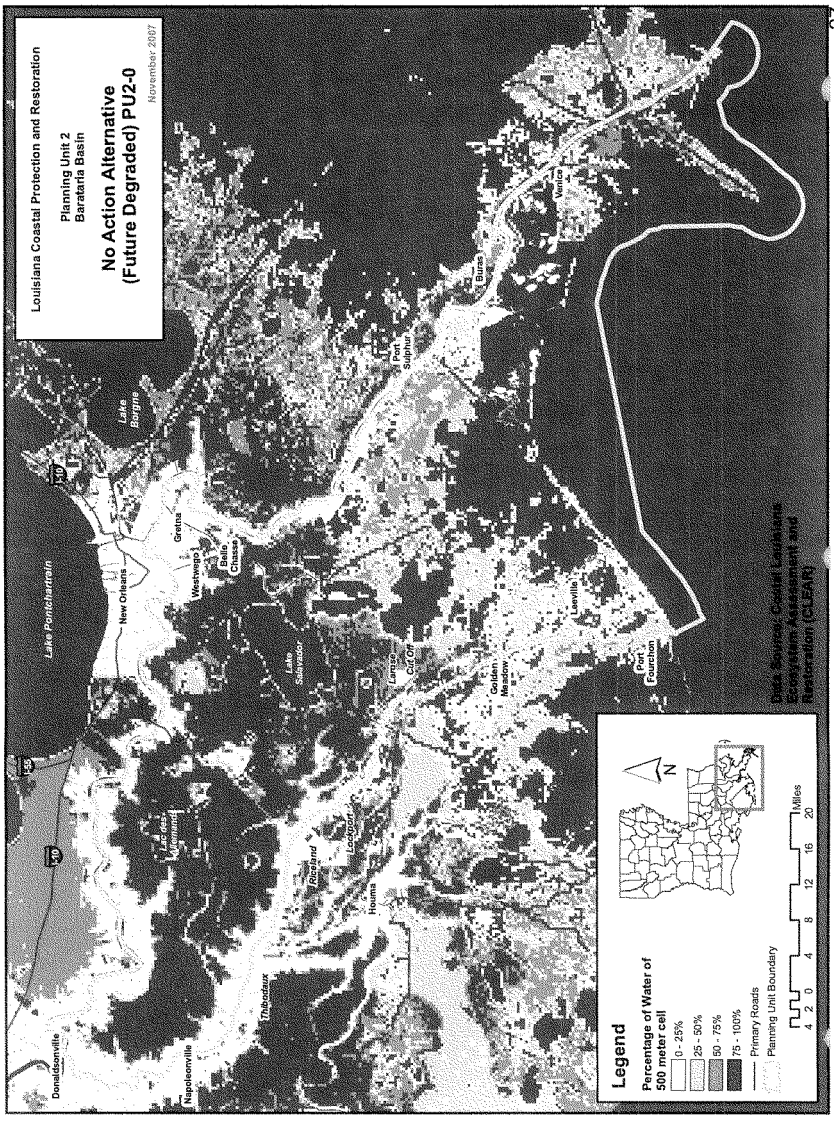
Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	0	22,019	792	1,461	3,239	285	54	16	3
		Mid		29,484	1,848	3,443	8,264	705	48	14	2
		Low		31,156	2,164	3,784	9,054	749	42	12	0
2	High RSLR High Employment Dispersed Population	High	0	25,950	1,443	2,586	6,480	581	54	14	3
		Mid		30,305	2,044	3,604	8,513	729	48	13	2
		Low		31,441	2,285	3,967	9,325	780	42	11	0
3	Low RSLR Business-as-Usual Compact Population	High	0	16,175	696	1,281	2,793	240	54	16	3
		Mid		22,294	1,601	2,753	6,635	552	48	14	2
		Low		23,789	1,851	3,050	7,283	587	42	12	0
4	High RSLR Business-as-Usual Compact Population	High	0	19,128	1,238	2,121	5,035	450	54	14	3
		Mid		22,774	1,737	2,932	6,880	577	48	13	2
		Low		23,929	1,927	3,243	7,484	612	42	11	0

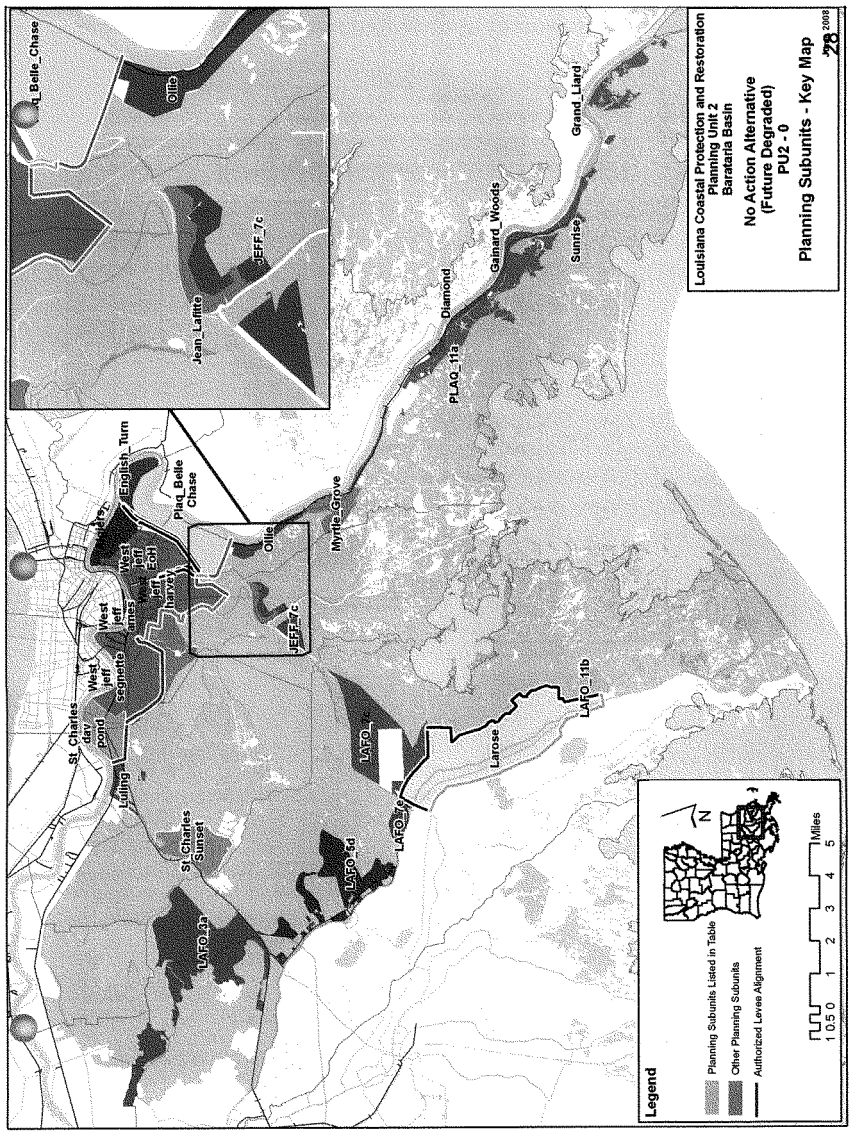
Other Results				Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Construction Time (years)			0	After 50 yrs (% of baseline)	81	79	81	79
Direct Wetland Impacts (acres)			0	After 100 yrs (% of baseline)	74	70	74	70
Indirect Impacts (unitless)			0	Present Value of Life Cycle Costs ($ Millions)				
Spatial Integrity (unitless)			0.21	Coastal Component	0	0	0	0
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)		Nonstructural Component	0	0	0	0
	1 / 2	0	0	Structural Component	0	0	0	0
	3 / 4	0	0	Total Project	0	0	0	0

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 2
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	
10-year	1,583	N/A	2,834	N/A	1,512	N/A	2,129	N/A	No Action Plan
100-year	46,652	N/A	49,467	N/A	37,218	N/A	39,133	N/A	
400-year	51,671	N/A	53,124	N/A	40,614	N/A	41,659	N/A	
1,000-year	53,208	N/A	54,188	N/A	41,777	N/A	42,556	N/A	
2,000-year	53,965	N/A	54,716	N/A	42,386	N/A	42,963	N/A	

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels.

1778


Louisiana Coastal Protection and Restoration
Planning Unit 2
Barataria Basin
No Action Alternative
(Future Degraded) PU2-0
November 2007
Lake Pontchartrain
Lake Borgne
New Orleans
Metairie
Kenner
Gretna
Westwego
Belle Chasse
Lake Salvador
Donaldsonville
Napoleonville
Thibodaux
Raceland
Houma
Lafourche
Lockport
Larose
Cut Off
Golden Meadow
Leeville
Port Fourchon
Port Sulphur
Buras
Venice
Legend
Percentage of Water of 500 meter cell
0 - 25%
25 - 50%
50 - 75%
75 - 100%
Primary Roads
Planning Unit Boundary
Miles
4 2 0 4 8 12 16 20
N
Data Source: Coastal Louisiana Ecosystem Assessment and Restoration (CLEAR)


Louisiana Coastal Protection and Restoration
Planning Unit 2
Barataria Basin
No Action Alternative
(Future Degraded)
PU2 - 0
Planning Subunits - Key Map
Legend
Planning Subunits Listed in Table
Other Planning Subunits
Authorized Levee Alignment
Miles
1 0.5 0 1 2 3 4 5
N
Jean_Lafitte
JEFF_7c
Ollie
Grand_Liard
Sunrise
Gainard_Woods
Diamond
PLAQ_11a
Myrtle_Grove
English_Turn
Plaq_Belle Chase
West Jeff EoH
West jeff ames
West jeff segnette
St_Charles dav pond
Luling
St_Charles Sunset
LAFO_3a
LAFO_5d
LAFO_7e
Larose
LAFO_11b

Alternative: PU2-0
Water Surface Elevations (feet - NAVD88 2004.65)

Planning Sub Unit	2010 (Base) Conditions						2060 (Future) Conditions					
	100-yr Event		400-year Event		1,000-yr Event		100-yr Event		400-year Event		1,000-yr Event	
	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project
Algiers	-3.8		10.7		12.1		12.9		16.3		17.9	
Diamond	13.0		16.7		18.9		16.2		26.3		30.2	
English_Turn	-1.7		10.7		12.1		12.9		16.3		17.9	
Gainard_Woods	13.5		17.3		19.7		16.7		20.5		22.9	
Grand_Liard	15.0		16.7		18.9		18.2		26.3		30.2	
Jean_Lafitte	8.4		11.9		14.0		13.0		16.9		19.3	
JEFF_7a	7.7		10.8		13.1		12.8		17.1		18.2	
JEFF_7c	8.4		11.9		14.0		22.7		27.6		30.0	
LAFO_11b	11.6		14.5		16.1		14.4		16.9		18.4	
LAFO_3a	3.9		5.1		6.0		7.0		8.2		9.0	
LAFO_5d	5.8		8.7		10.9		10.6		13.4		15.1	
LAFO_7c	7.1		9.1		10.3		12.0		14.2		15.4	
LAFO_7e	8.1		11.3		13.4		12.5		15.3		17.3	
Larose	-2.5		9.0		12.0		15.0		15.0		15.0	
Luling	6.1		8.6		10.2		11.8		15.5		17.4	
Myrtle_Grove	10.3		13.8		15.7		13.5		17.3		18.6	
Ollie	8.0		13.2		15.3		11.2		19.2		22.1	
PLAQ_11a	12.5		16.7		18.9		15.9		20.5		22.9	
Plaq_Belle_Chase	-2.6		11.0		11.3		11.6		14.3		15.8	
St_Charles_dav_pond	1.6		4.8		11.0		11.0		13.2		14.5	
St_Charles_Sunset	7.0		9.4		10.7		10.0		12.3		13.7	
Sunrise	15.0		16.7		18.9		18.2		26.3		30.2	
West_jeff_ames	-1.5		11.0		11.3		11.6		14.3		15.8	
West_jeff_EoH	-3.5		11.0		11.3		11.6		14.3		15.8	
West_jeff_harvey	-2.4		11.0		11.3		11.6		14.3		15.8	
West_jeff_segnette	-3.9		11.0		11.3		11.6		14.3		15.8	
Evaluation Parameters	Confidence Level:			90%		Levee Design:			No Friction Waves			
	Future Relative Sea Level Rise:			3.2 feet		Levee Overtopping:			No Friction Waves			

Planning Un..	2	**Alt. No.:**	F -R1	**Category:**	Coastal Restoration Only
Alternative Description:	Sustain coastal landscape through restoration including shoreline protection, marsh creation, and steady state diversions.				
Coastal Component:	R1 (steady state diversions)		**Nonstructural Component:**		None
Structural Component:	No new levees or increases in risk reduction level for existing levees.				

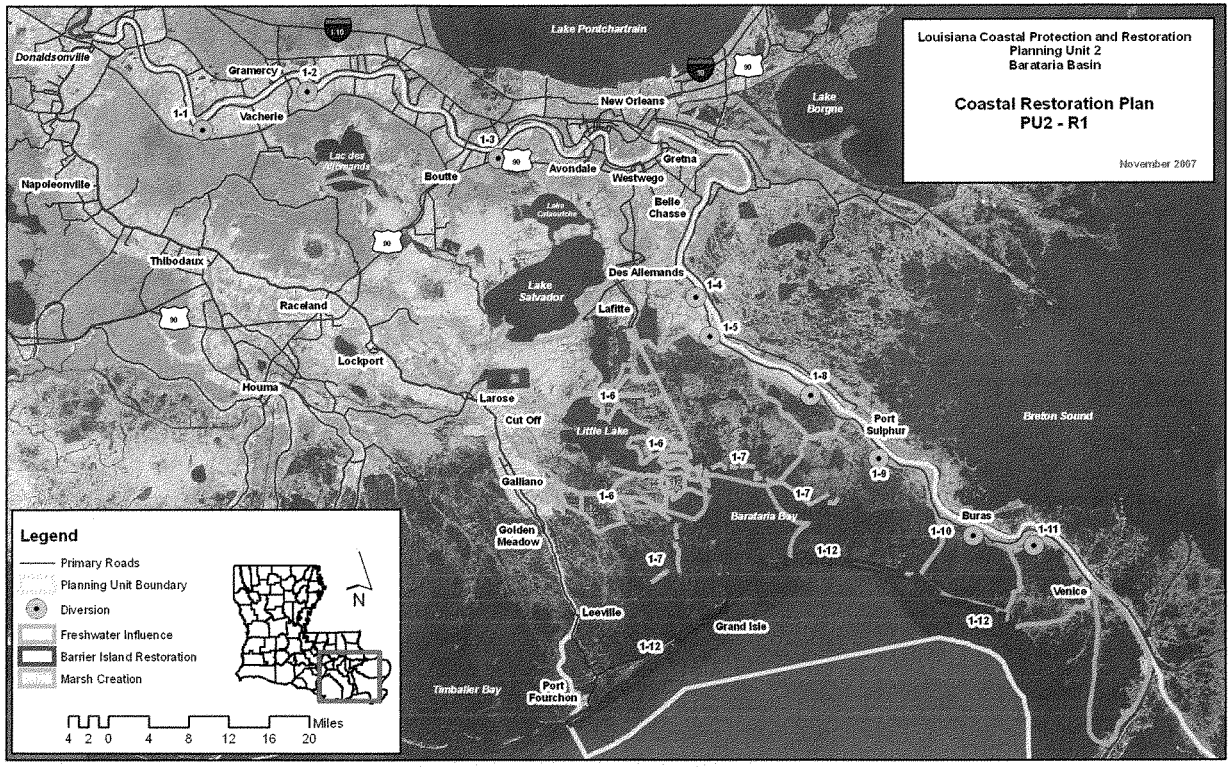
Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv $ Millions	Ann. Equiv. #	Ann. Equiv $ Millions	Ann. Equiv $ Millions	Ann. Equiv #	Ann. Equiv $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	766	15,567	338	563	1,203	77	272	16	7
		Mid		19,716	722	1,063	2,885	187	213	15	6
		Low		21,148	967	1,521	3,806	249	154	13	4
2	High RSLR High Employment Dispersed Population	High	768	15,853	407	711	1,521	110	272	14	7
		Mid		20,012	799	1,193	3,074	208	213	14	6
		Low		21,392	1,063	1,649	4,020	275	154	12	4
3	Low RSLR Business-as-Usual Compact Population	High	766	10,722	330	540	1,193	75	272	16	7
		Mid		14,505	682	938	2,655	161	213	15	6
		Low		15,958	898	1,318	3,411	211	154	13	4
4	High RSLR Business-as-Usual Compact Population	High	768	10,953	370	688	1,433	99	272	14	7
		Mid		14,697	740	1,106	2,857	185	213	14	6
		Low		16,058	962	1,484	3,568	232	154	12	4

Other Results			Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Construction Time (years)		15	After 50 yrs (% of baseline)	101	99	101	99
Direct Wetland Impacts (acres)		0	After 100 yrs (% of baseline)	108	104	108	104
Indirect Impacts (unitless)		0	Present Value of Life Cycle Costs ($ Millions)				
Spatial Integrity (unitless)		0.36	Coastal Component	15,001	15,033	15,001	15,033
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)	Nonstructural Component	0	0	0	0
	1 / 2	5,250 5,261	Structural Component	0	0	0	0
	3 / 4	5,250 5,261	Total Project	15,001	15,033	15,001	15,033

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 2 Coastal Plan Coastal Restoration Alt
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	
10-year	1,583	1,805	2,834	3,062	1,512	1,692	2,129	2,316	
100-year	46,652	6,117	49,467	8,115	37,218	4,915	39,133	6,429	
400-year	51,671	46,912	53,124	47,987	40,614	37,201	41,659	37,872	
1,000-year	53,208	50,259	54,188	51,146	41,777	39,600	42,556	40,134	
2,000-year	53,965	51,581	54,716	52,300	42,386	40,485	42,963	40,926	

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels.

1782


Louisiana Coastal Protection and Restoration
Planning Unit 2
Barataria Basin
Coastal Restoration Plan
PU2 - R1
November 2007
Lake Pontchartrain
Donaldsonville
Gramercy
Vacherie
New Orleans
Lake Borgne
Napoleonville
Boutte
Avondale
Westwego
Gretna
Belle Chasse
Thibodaux
Raceland
Lake Salvador
Des Allemands
Lafitte
Lockport
Houma
Larose
Cut Off
Little Lake
Port Sulphur
Breton Sound
Galliano
Golden Meadow
Barataria Bay
Buras
Venice
Leeville
Grand Isle
Port Fourchon
Timbalier Bay
1-1
1-2
1-3
1-4
1-5
1-6
1-7
1-8
1-9
1-10
1-11
1-12
Legend
Primary Roads
Planning Unit Boundary
Diversion
Freshwater Influence
Barrier Island Restoration
Marsh Creation
N
Miles
4 2 0 4 8 12 16 20

1783

Planning Ur.	2	Alt. No.:	-R2	Category:	Coastal Restoration Only
Alternative Description:	Sustain coastal landscape through restoration including shoreline protection, marsh creation, and pulsed diversions.				
Coastal Component:	R2 (pulsed diversions)		Nonstructural Component:		None
Structural Component:	No new levees or increases in risk reduction level for existing levees.				

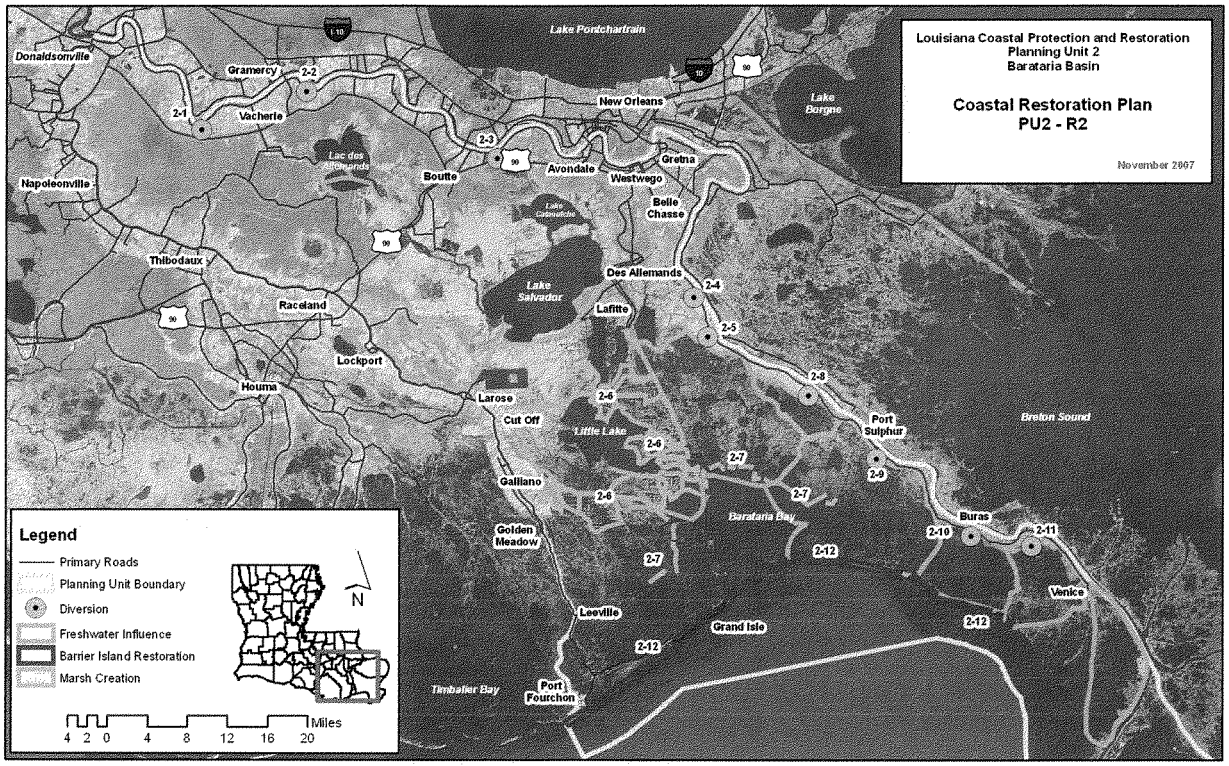
Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	800	15,567	338	563	1,203	77	272	16	7
		Mid		19,716	722	1,063	2,885	187	213	15	6
		Low		21,148	967	1,521	3,806	249	154	13	4
2	High RSLR High Employment Dispersed Population	High	801	15,853	407	711	1,521	110	272	14	7
		Mid		20,012	799	1,193	3,074	208	213	14	6
		Low		21,392	1,063	1,649	4,020	275	154	12	4
3	Low RSLR Business-as-Usual Compact Population	High	800	10,722	330	540	1,193	75	272	16	7
		Mid		14,505	682	938	2,655	161	213	15	6
		Low		15,958	898	1,318	3,411	211	154	13	4
4	High RSLR Business-as-Usual Compact Population	High	801	10,953	370	688	1,433	99	272	14	7
		Mid		14,697	740	1,106	2,857	185	213	14	6
		Low		16,058	962	1,484	3,568	232	154	12	4

Other Results			
Construction Time (years)			15
Direct Wetland Impacts (acres)			0
Indirect Impacts (unitless)			0
Spatial Integrity (unitless)			0.36
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)	
	1 / 2	5,480	5,491
	3 / 4	5,480	5,491

Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
After 50 yrs (% of baseline)	103	99	103	99
After 100 yrs (% of baseline)	110	104	110	104
Present Value of Life Cycle Costs ($ Millions)				
Coastal Component	15,657	15,689	15,657	15,689
Nonstructural Component	0	0	0	0
Structural Component	0	0	0	0
Total Project	15,657	15,689	15,657	15,689

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 2 Coastal Plan Coastal Restoration Alt
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	
10-year	1,583	1,805	2,834	3,062	1,512	1,692	2,129	2,316	
100-year	46,652	6,117	49,467	8,115	37,218	4,915	39,133	6,429	
400-year	51,671	46,912	53,124	47,987	40,614	37,201	41,659	37,872	
1,000-year	53,208	50,259	54,188	51,146	41,777	39,600	42,556	40,134	
2,000-year	53,965	51,581	54,716	52,300	42,386	40,485	42,963	40,926	

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels.


Louisiana Coastal Protection and Restoration
Planning Unit 2
Barataria Basin
Coastal Restoration Plan
PU2 - R2
November 2007
Lake Pontchartrain
Donaldsonville
Gramercy
2-2
2-1
Vacherie
New Orleans
Lake Borgne
2-3
Gretna
Avondale
Westwego
Boutte
Napoleonville
Belle Chasse
Thibodaux
Des Allemands
Lake Salvador
2-4
Raceland
Lafitte
2-5
Lockport
Houma
2-8
Larose
2-6
Cut Off
Little Lake
Port Sulphur
Breton Sound
2-9
2-7
Galliano
Barataria Bay
Buras
2-10
2-11
Golden Meadow
2-12
Venice
Leeville
Grand Isle
Timbalier Bay
Port Fourchon
Legend
Primary Roads
Planning Unit Boundary
Diversion
Freshwater Influence
Barrier Island Restoration
Marsh Creation
N
Miles
4 2 0 4 8 12 16 20

1785

Planning Un...	2	**Alt. No.:**	F_2-R3	**Category:**	Coastal Restoration Only
Alternative Description:	Sustain coastal landscape through restoration including shoreline protection, marsh creation, and diversions as proposed in the State Master Plan.				
Coastal Component:	R3 (state plan)		**Nonstructural Component:**		None
Structural Component:	No new levees or increases in risk reduction level for existing levees.				

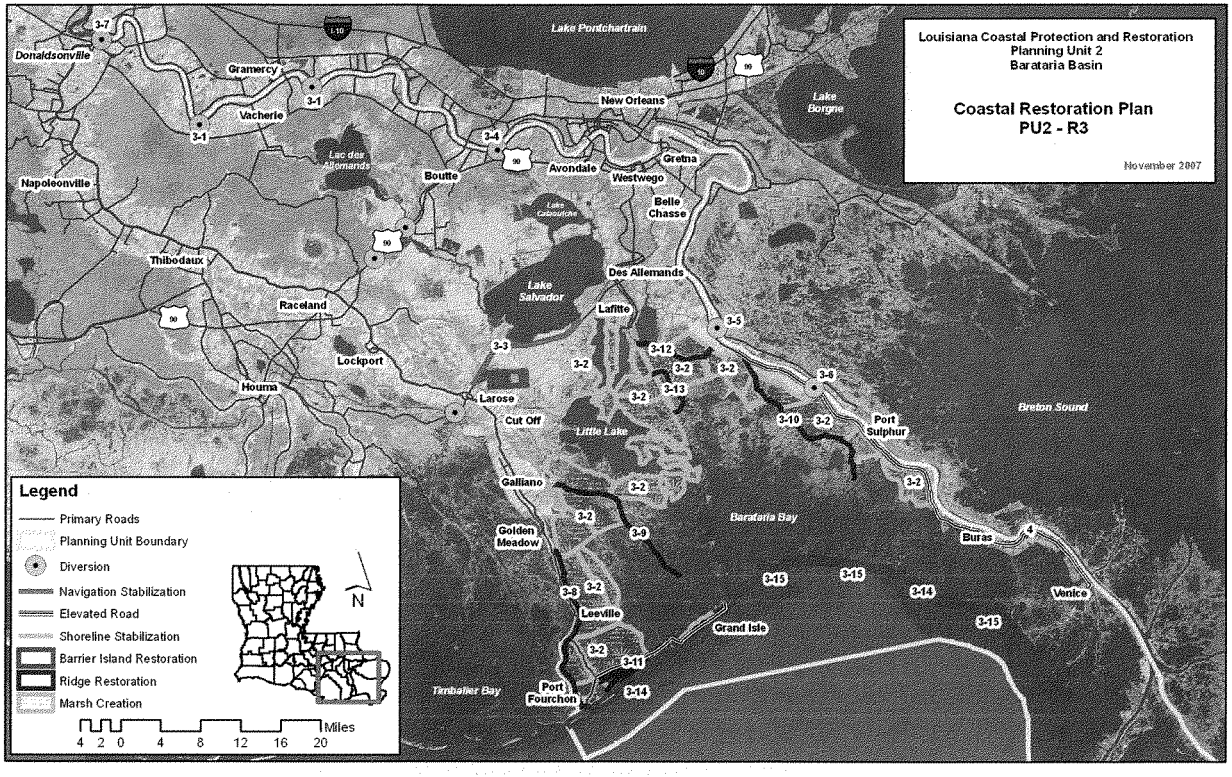
Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv $ Millions	Ann. Equiv. #	Ann. Equiv $ Millions	Ann. Equiv $ Millions	Ann. Equiv #	Ann. Equiv $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	932	15,567	338	563	1,203	77	272	16	7
		Mid		19,716	722	1,063	2,885	187	213	15	6
		Low		21,148	967	1,521	3,806	249	154	13	4
2	High RSLR High Employment Dispersed Population	High	937	15,853	407	711	1,521	110	272	14	7
		Mid		20,012	799	1,193	3,074	208	213	14	6
		Low		21,392	1,063	1,649	4,020	275	154	12	4
3	Low RSLR Business-as-Usual Compact Population	High	932	10,722	330	540	1,193	75	272	16	7
		Mid		14,505	682	938	2,655	161	213	15	6
		Low		15,958	898	1,318	3,411	211	154	13	4
4	High RSLR Business-as-Usual Compact Population	High	937	10,953	370	688	1,433	99	272	14	7
		Mid		14,697	740	1,106	2,857	185	213	14	6
		Low		16,058	962	1,484	3,568	232	154	12	4

Other Results				Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Construction Time (years)			15	After 50 yrs (% of baseline)	105	104	105	104
Direct Wetland Impacts (acres)			0	After 100 yrs (% of baseline)	101	98	101	98
Indirect Impacts (unitless)			0	Present Value of Life Cycle Costs ($ Millions)				
Spatial Integrity (unitless)			0.40	Coastal Component	18,245	18,355	18,245	18,355
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)		Nonstructural Component	0	0	0	0
	1 / 2	6,386	6,424	Structural Component	0	0	0	0
	3 / 4	6,386	6,424	Total Project	18,245	18,355	18,245	18,355

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 2 Coastal Plan Coastal Restoration Alt
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	
10-year	1,583	1,805	2,834	3,062	1,512	1,692	2,129	2,316	
100-year	46,652	6,117	49,467	8,115	37,218	4,915	39,133	6,429	
400-year	51,671	46,912	53,124	47,987	40,614	37,201	41,659	37,872	
1,000-year	53,208	50,259	54,188	51,146	41,777	39,600	42,556	40,134	
2,000-year	53,965	51,581	54,716	52,300	42,386	40,485	42,963	40,926	

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels.

1786


Louisiana Coastal Protection and Restoration
Planning Unit 2
Barataria Basin
Coastal Restoration Plan
PU2 - R3
November 2007
Legend
Primary Roads
Planning Unit Boundary
Diversion
Navigation Stabilization
Elevated Road
Shoreline Stabilization
Barrier Island Restoration
Ridge Restoration
Marsh Creation
Miles
4 2 0 4 8 12 16 20
N
Lake Pontchartrain
Lake Borgne
Breton Sound
Barataria Bay
Timbalier Bay
Donaldsonville
Gramercy
Vacherie
New Orleans
Napoleonville
Boutte
Avondale
Westwego
Gretna
Belle Chasse
Thibodaux
Raceland
Lockport
Houma
Larose
Cut Off
Lafitte
Des Allemands
Lake Salvador
Little Lake
Galliano
Golden Meadow
Leeville
Grand Isle
Port Fourchon
Port Sulphur
Buras
Venice
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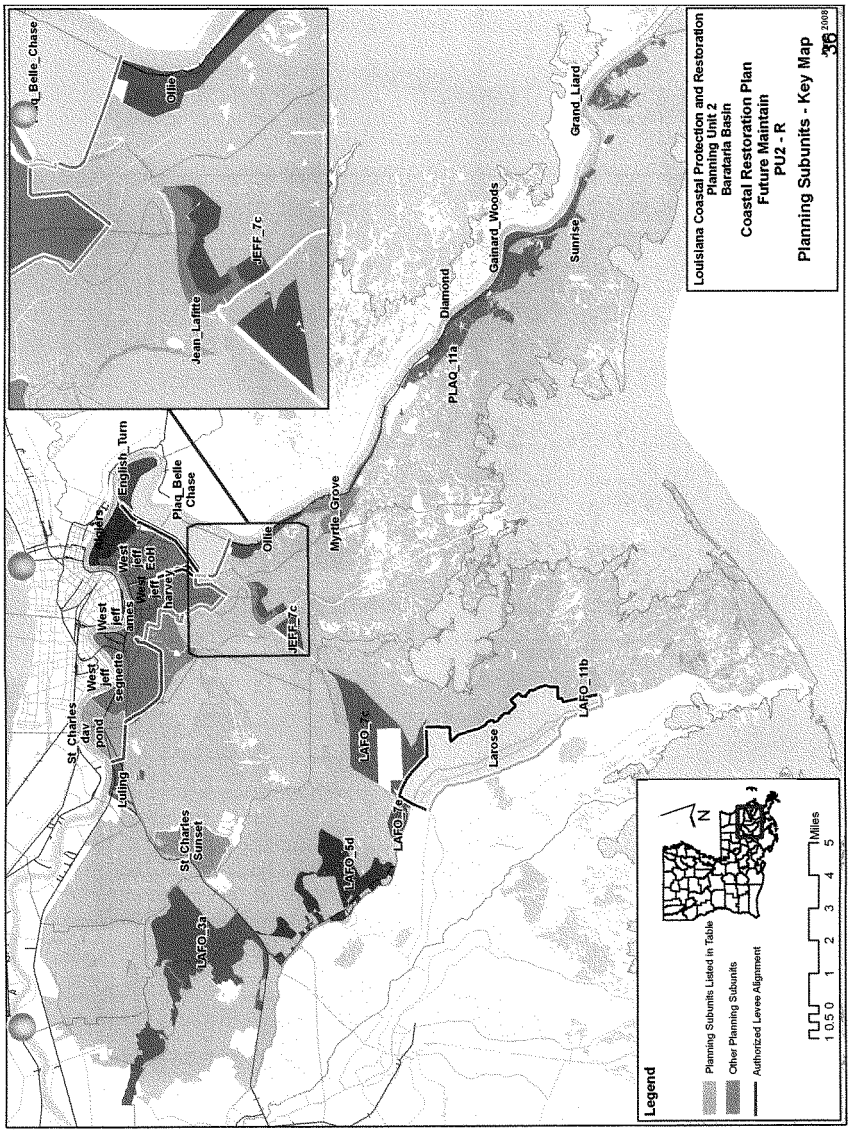
3-14
3-15
4

1787


Louisiana Coastal Protection and Restoration
Planning Unit 2
Barataria Basin
Coastal Restoration Plan
Future Maintain
PU2 - R
Planning Subunits - Key Map
Jan 2008
36
Legend
Planning Subunits Listed in Table
Other Planning Subunits
Authorized Levee Alignment
N
1 0.5 0 1 2 3 4 5
Miles
Jean_Lafitte
JEFF_7c
Ollie
Grand_Liard
Sunrise
Gainard_Woods
Diamond
PLAQ_11a
Myrtle_Grove
Plaq_Belle Chase
English_Turn
West jeff EoH
West jeff harvey
West jeff ames
West jeff segnette
St_Charles dav pond
Luling
St_Charles Sunset
LAFO_3a
LAFO_5d
LAFO_7e
LAFO_7c
Larose
LAFO_11b

Alternative: PU2-R1, R2, and R3

Water Surface Elevations (feet - NAVD88 2004.65)

Planning Sub Unit	2010 (Base) Conditions*						2060 (Future) Conditions					
	100-yr Event		400-year Event		1,000-yr Event		100-yr Event		400-year Event		1,000-yr Event	
	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project
Algiers	-3.9	-3.9	10.7	10.7	12.1	12.1	12.9	-3.9	16.3	10.7	17.9	10.7
Diamond	13.0	13.0	16.7	16.7	18.9	18.9	16.2	16.2	26.3	19.9	30.2	22.1
English_Turn	-1.7	-1.7	10.7	10.7	12.1	12.1	12.9	-1.7	16.3	10.7	17.9	12.1
Gainard_Woods	13.5	13.5	17.3	17.3	19.7	19.7	16.7	16.7	20.5	20.5	22.9	22.9
Grand_Liard	15.0	15.0	16.7	16.7	18.9	18.9	18.2	18.2	26.3	19.9	30.2	22.1
Jean_Lafitte	8.4	8.4	11.9	11.9	14.0	14.0	13.0	11.6	16.9	15.1	19.3	17.2
JEFF_7a	7.7	7.7	10.8	10.8	13.1	13.1	12.8	10.9	17.1	14.0	18.2	16.3
JEFF_7c	8.4	8.4	11.9	11.9	14.0	14.0	22.7	11.6	27.6	15.1	30.0	17.2
LAFO_11b	11.6	11.6	14.5	14.5	16.1	16.1	14.4	14.4	16.9	16.9	18.4	18.4
LAFO_3a	3.9	3.9	5.1	5.1	6.0	6.0	7.0	7.0	8.2	8.2	9.0	9.0
LAFO_5d	5.8	5.8	8.7	8.7	10.9	10.9	10.6	9.0	13.4	11.9	15.1	14.1
LAFO_7c	7.1	7.1	9.1	9.1	10.3	10.3	12.0	10.3	14.2	12.3	15.4	13.5
LAFO_7e	8.1	8.1	11.3	11.3	13.4	13.4	12.5	11.3	15.3	14.5	17.3	16.6
Larose	-2.5	-2.5	9.0	9.0	12.0	12.0	15.0	-2.5	15.0	9.0	15.0	12.0
Luling	6.1	6.1	8.6	8.6	10.2	10.2	11.8	9.3	15.5	11.8	17.4	13.4
Myrtle_Grove	10.3	10.3	13.8	13.8	15.7	15.7	13.5	13.5	17.3	17.0	18.6	18.6
Ollie	8.0	8.0	13.2	13.2	15.3	15.3	11.2	11.2	19.2	16.4	22.1	18.5
PLAQ_11a	12.5	12.5	16.7	16.7	18.9	18.9	15.9	15.7	20.5	19.9	22.9	22.1
Plaq_Belle_Chase	-2.7	-2.7	11.0	11.0	11.3	11.3	11.6	-2.7	14.3	11.0	15.8	11.3
St_Charles_dav_pond	1.6	1.6	4.8	4.8	11.0	11.0	11.0	1.6	13.2	4.8	14.5	11.0
St_Charles_Sunset	7.0	7.0	9.4	9.4	10.7	10.7	10.0	10.0	12.3	12.3	13.7	13.7
Sunrise	15.0	15.0	16.7	16.7	18.9	18.9	18.2	18.2	26.3	19.9	30.2	22.1
West_jeff_ames	-1.5	-1.5	11.0	11.0	11.3	11.3	11.6	-1.5	14.3	11.0	15.8	11.3
West_jeff_EoH	-3.6	-3.6	11.0	11.0	11.3	11.3	11.6	-3.6	14.3	11.0	15.8	11.3
West_jeff_harvey	-2.4	-2.4	11.0	11.0	11.3	11.3	11.6	-2.4	14.3	11.0	15.8	11.3
West_jeff_segnette	-3.9	-3.9	11.0	11.0	11.3	11.3	11.6	-3.9	14.3	11.0	15.8	11.3
Evaluation Parameters	Confidence Level:			90%		Levee Design:			No Friction Waves			
	Future Relative Sea Level Rise:			3.2 feet		Levee Overtopping:			No Friction Waves			

* With and without project base conditions (2010) are the same for coastal restoration only plans.

1789

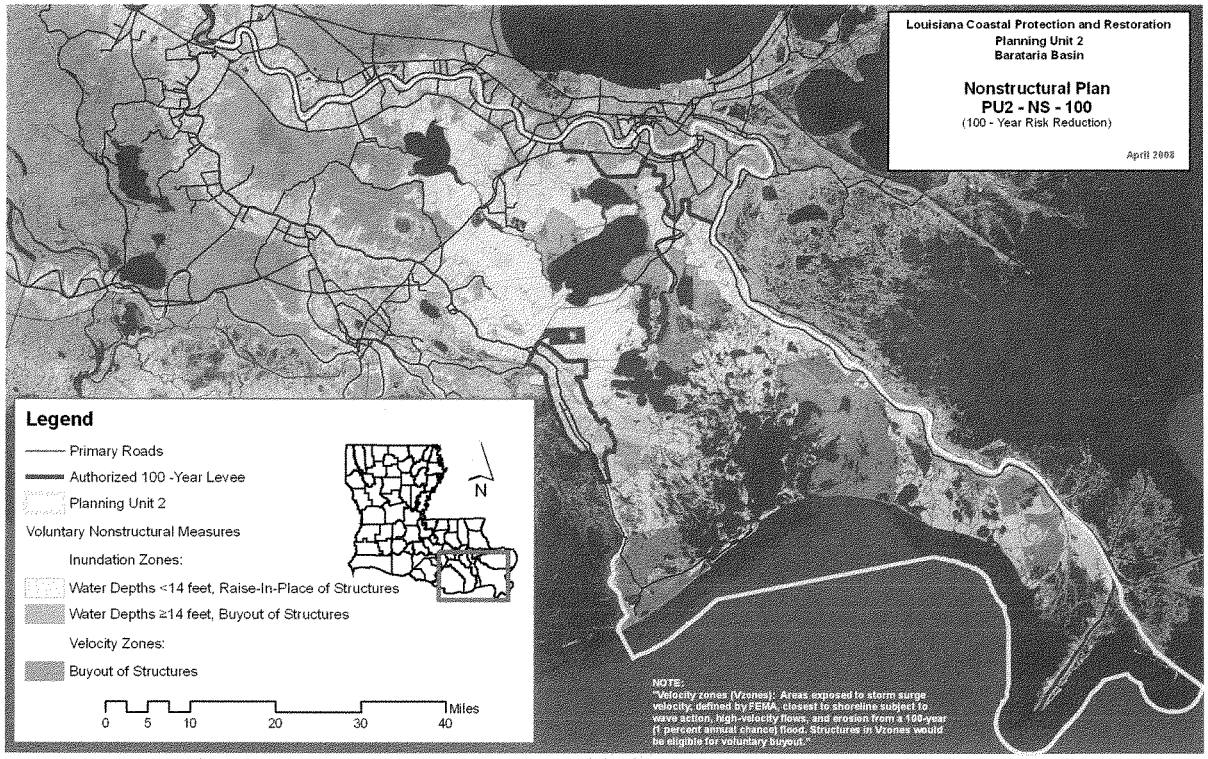
Planning Unit	2	Alt. No.:	PU 2-100	Category:	Coastal Restoration + Nonstructural Measures
Alternative Description:	Sustain coastal landscape through restoration. Implement comprehensive 100-year nonstructural measures.				
Coastal Component:	R2 (pulsed diversions)		Nonstructural Component:		100-yr stand alone measures
Structural Component:	No new levees or increases in risk reduction level for existing levees.				

Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	1,017	14,024	159	166	462	24	272	16	7
		Mid		17,787	444	549	1,890	105	213	15	6
		Low		19,187	649	797	2,611	145	154	13	4
2	High RSLR High Employment Dispersed Population	High	1,018	14,171	187	262	668	44	272	14	7
		Mid		17,939	487	617	2,019	117	213	14	6
		Low		19,312	701	868	2,745	160	154	12	4
3	Low RSLR Business-as-Usual Compact Population	High	1,023	9,774	147	157	458	23	272	16	7
		Mid		13,326	420	492	1,783	92	213	15	6
		Low		14,794	592	709	2,415	127	154	13	4
4	High RSLR Business-as-Usual Compact Population	High	1,025	9,893	165	255	628	40	272	14	7
		Mid		13,425	451	588	1,931	107	213	14	6
		Low		14,846	630	801	2,523	139	154	12	4

Other Results			Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Construction Time (years)		15	After 50 yrs (% of baseline)	103	99	103	99
Direct Wetland Impacts (acres)		0	After 100 yrs (% of baseline)	110	104	110	104
Indirect Impacts (unitless)		0	Present Value of Life Cycle Costs ($ Millions)				
Spatial Integrity (unitless)		0.36	Coastal Component	15,657	15,689	15,657	15,689
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)	Nonstructural Component	4,263	4,263	4,391	4,391
	1 / 2	6,972	Structural Component	0	0	0	0
	3 / 4	7,017	Total Project	19,920	19,952	20,048	20,080
		7,028					

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 2
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		Nonstructural Plan
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	
10-year	1,583	629	2,834	1,754	1,512	491	2,129	983	
100-year	46,652	3,483	49,467	5,724	37,218	2,278	39,133	4,200	
400-year	51,671	44,758	53,124	46,011	40,614	35,265	41,659	36,162	
1,000-year	53,208	48,282	54,188	49,205	41,777	37,928	42,556	38,541	100-year Design
2,000-year	53,965	49,627	54,716	50,418	42,386	38,886	42,963	39,404	

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels.


Louisiana Coastal Protection and Restoration
Planning Unit 2
Barataria Basin
Nonstructural Plan
PU2 - NS - 100
(100 - Year Risk Reduction)
April 2008
Legend
Primary Roads
Authorized 100 -Year Levee
Planning Unit 2
Voluntary Nonstructural Measures
Inundation Zones:
Water Depths <14 feet, Raise-In-Place of Structures
Water Depths ≥14 feet, Buyout of Structures
Velocity Zones:
Buyout of Structures
N
0 5 10 20 30 40 Miles
NOTE:
"Velocity zones (Vzones): Areas exposed to storm surge velocity, defined by FEMA, closest to shoreline subject to wave action, high-velocity flows, and erosion from a 100-year (1 percent annual chance) flood. Structures in Vzones would be eligible for voluntary buyout."

1791

Planning Ur	2	**Alt. No.:**	PU. S-400	**Category:**	Coastal Restoration + Nonstructural M sures
Alternative Description:	Sustain coastal landscape through restoration. Implement comprehensive 400-year nonstructural measures.				
Coastal Component:	R2 (pulsed diversions)		**Nonstructural Component:**		400-yr stand alone measures
Structural Component:	No new levees or increases in risk reduction level for existing levees.				

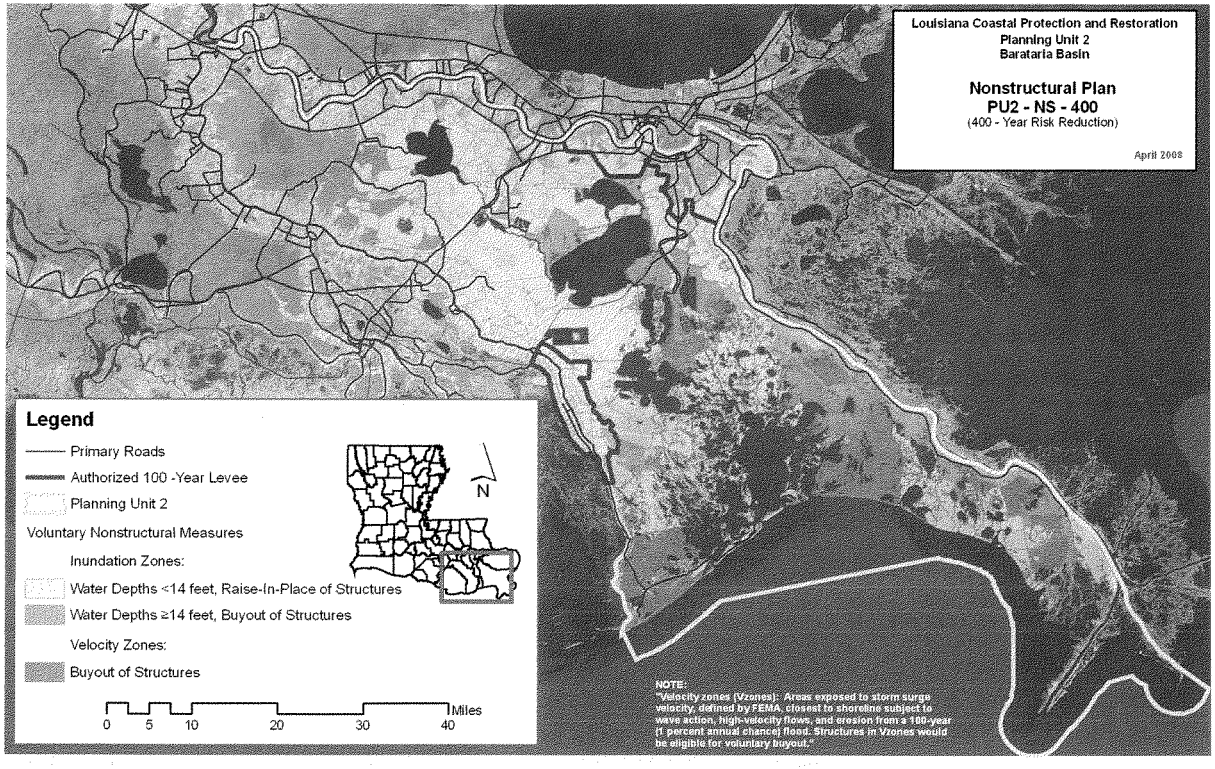
Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	1,603	11,761	115	108	306	14	272	16	7
		Mid		15,241	241	230	935	43	213	15	6
		Low		16,460	332	488	1,873	92	154	13	4
2	High RSLR High Employment Dispersed Population	High	1,604	11,908	120	127	343	17	272	14	7
		Mid		15,394	252	253	966	46	213	14	6
		Low		16,586	360	595	2,045	110	154	12	4
3	Low RSLR Business-as-Usual Compact Population	High	2,206	7,989	113	107	303	13	272	16	7
		Mid		11,306	239	227	942	42	213	15	6
		Low		12,534	324	457	1,826	87	154	13	4
4	High RSLR Business-as-Usual Compact Population	High	2,208	8,108	116	129	359	18	272	14	7
		Mid		11,406	247	250	985	46	213	14	6
		Low		12,585	339	584	2,001	105	154	12	4

Other Results			Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Construction Time (years)		15	After 50 yrs (% of baseline)	103	99	103	99
Direct Wetland Impacts (acres)		0	After 100 yrs (% of baseline)	110	104	110	104
Indirect Impacts (unitless)		0	Present Value of Life Cycle Costs ($ Millions)				
Spatial Integrity (unitless)		0.36	Coastal Component	15,657	15,689	15,657	15,689
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)	Nonstructural Component	15,762	15,762	27,608	27,608
	1 / 2	10,997 11,008	Structural Component	0	0	0	0
	3 / 4	15,143 15,154	Total Project	31,419	31,451	43,265	43,297

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 2
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		Nonstructural Plan
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	
10-year	1,583	256	2,834	577	1,512	211	2,129	405	
100-year	46,652	517	49,467	1,821	37,218	445	39,133	1,044	
400-year	51,671	5,548	53,124	7,537	40,614	4,016	41,659	5,752	
1,000-year	53,208	13,451	54,188	14,793	41,777	9,816	42,556	10,693	
2,000-year	53,965	24,867	54,716	25,943	42,386	18,767	42,963	19,548	400-year Design

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels.

1792


Louisiana Coastal Protection and Restoration
Planning Unit 2
Barataria Basin
Nonstructural Plan
PU2 - NS - 400
(400 - Year Risk Reduction)
April 2008
Legend
Primary Roads
Authorized 100 -Year Levee
Planning Unit 2
Voluntary Nonstructural Measures
Inundation Zones:
Water Depths <14 feet, Raise-In-Place of Structures
Water Depths ≥14 feet, Buyout of Structures
Velocity Zones:
Buyout of Structures
N
0 5 10 20 30 40 Miles
NOTE:
"Velocity zones (Vzones): Areas exposed to storm surge velocity, defined by FEMA, closest to shoreline subject to wave action, high-velocity flows, and erosion from a 100-year (1 percent annual chance) flood. Structures in Vzones would be eligible for voluntary buyout."

1793

Planning Ur.	2	**Alt. No.:**	PU2 -1000	**Category:**	Coastal Restoration + Nonstructural M sures
Alternative Description:	Sustain coastal landscape through restoration. Implement comprehensive 1000-year nonstructural measures.				
Coastal Component:	R2 (pulsed diversions)		**Nonstructural Component:**		1000-yr stand alone measures
Structural Component:	No new levees or increases in risk reduction level for existing levees.				

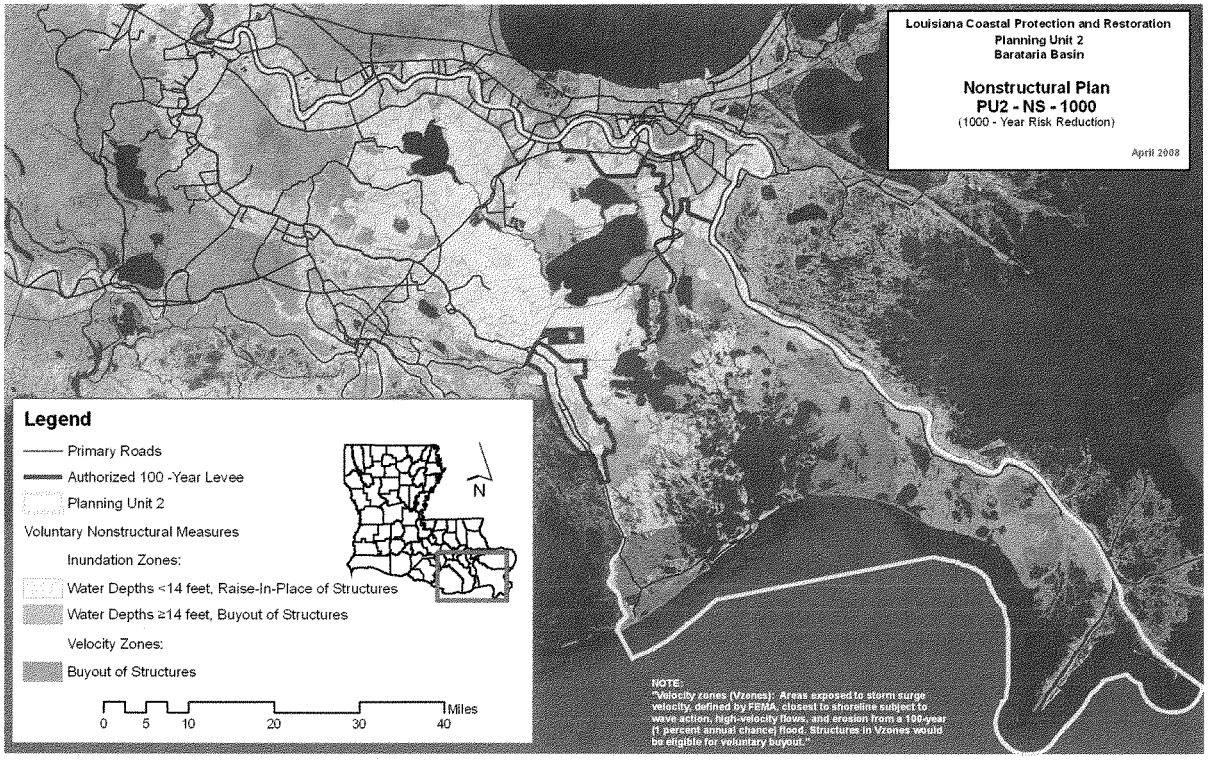
Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	2,294	11,358	111	108	304	14	272	16	7
		Mid		14,699	227	180	761	32	213	15	6
		Low		15,909	302	270	1,058	45	154	13	4
2	High RSLR High Employment Dispersed Population	High	2,296	11,505	113	109	308	14	272	14	7
		Mid		14,852	232	190	783	34	213	14	6
		Low		16,035	312	305	1,128	51	154	12	4
3	Low RSLR Business-as-Usual Compact Population	High	2,316	7,845	110	106	300	13	272	16	7
		Mid		11,051	228	178	769	32	213	15	6
		Low		12,275	301	261	1,035	43	154	13	4
4	High RSLR Business-as-Usual Compact Population	High	2,318	7,963	111	107	307	14	272	14	7
		Mid		11,150	231	186	794	34	213	14	6
		Low		12,326	306	309	1,137	52	154	12	4

Other Results			
Construction Time (years)			15
Direct Wetland Impacts (acres)			0
Indirect Impacts (unitless)			0
Spatial Integrity (unitless)			0.36
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)	
	1 / 2	15,745	15,756
	3 / 4	15,897	15,908

Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
After 50 yrs (% of baseline)	103	99	103	99
After 100 yrs (% of baseline)	110	104	110	104
Present Value of Life Cycle Costs ($ Millions)				
Coastal Component	15,657	15,689	15,657	15,689
Nonstructural Component	29,329	29,329	29,764	29,764
Structural Component	0	0	0	0
Total Project	44,986	45,018	45,421	45,453

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 2
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	Nonstructural Plan
10-year	1,583	155	2,834	288	1,512	131	2,129	187	
100-year	46,652	349	49,467	670	37,218	310	39,133	491	
400-year	51,671	1,950	53,124	3,902	40,614	1,573	41,659	2,652	
1,000-year	53,208	4,675	54,188	6,759	41,777	3,346	42,556	5,180	1000-year Design
2,000-year	53,965	9,862	54,716	11,766	42,386	7,641	42,963	8,659	

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels.


Louisiana Coastal Protection and Restoration
Planning Unit 2
Barataria Basin
Nonstructural Plan
PU2 - NS - 1000
(1000 - Year Risk Reduction)
April 2008
Legend
Primary Roads
Authorized 100 -Year Levee
Planning Unit 2
Voluntary Nonstructural Measures
Inundation Zones:
Water Depths <14 feet, Raise-In-Place of Structures
Water Depths ≥14 feet, Buyout of Structures
Velocity Zones:
Buyout of Structures
N
0 5 10 20 30 40 Miles
NOTE:
"Velocity zones (Vzones): Areas exposed to storm surge velocity, defined by FEMA, closest to shoreline subject to wave action, high-velocity flows, and erosion from a 100-year (1 percent annual chance) flood. Structures in Vzones would be eligible for voluntary buyout."

1795

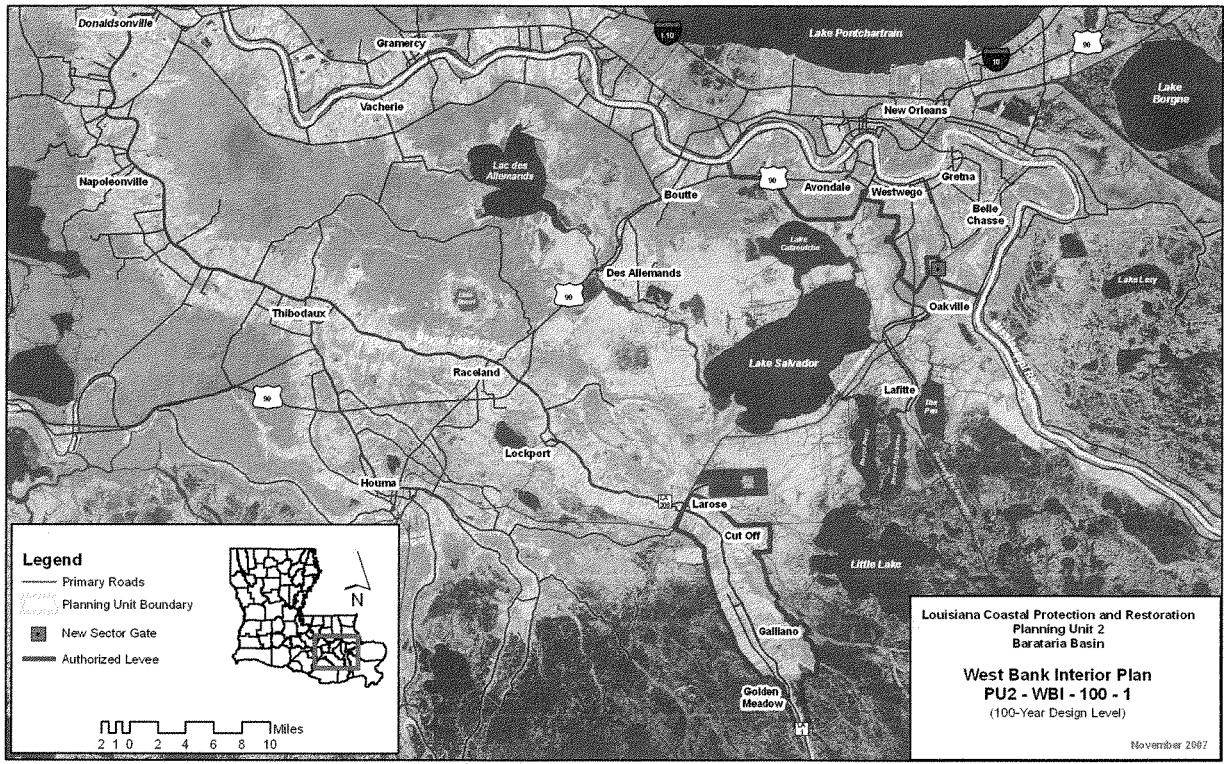
Planning Ur.	2	**Alt. No.:**	PU2- .I-100-1	**Category:**	Coastal Restoration + Structural Meas s
Alternative Description:	Sustain coastal landscape through restoration. Construct new sector gate on Bayou Barataria to reduce risk on the West Bank.				
Coastal Component:	R2 (pulsed diversions)		**Nonstructural Component:**		None
Structural Component:	See alternative description above.				

Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	851	15,555	353	581	1,264	84	266	17	8
		Mid		19,088	683	1,050	2,670	179	213	15	7
		Low		20,935	983	1,541	3,883	256	160	14	6
2	High RSLR High Employment Dispersed Population	High	853	16,029	449	772	1,722	128	266	15	7
		Mid		19,381	758	1,167	2,840	197	213	14	7
		Low		21,153	1,070	1,657	4,075	279	160	13	6
3	Low RSLR Business-as-Usual Compact Population	High	851	10,792	340	523	1,230	80	266	17	8
		Mid		14,045	644	916	2,449	154	213	15	7
		Low		15,876	921	1,335	3,491	218	160	14	6
4	High RSLR Business-as-Usual Compact Population	High	853	11,162	406	725	1,563	112	266	15	7
		Mid		14,233	700	1,064	2,629	175	213	14	7
		Low		15,966	977	1,483	3,632	236	160	13	6

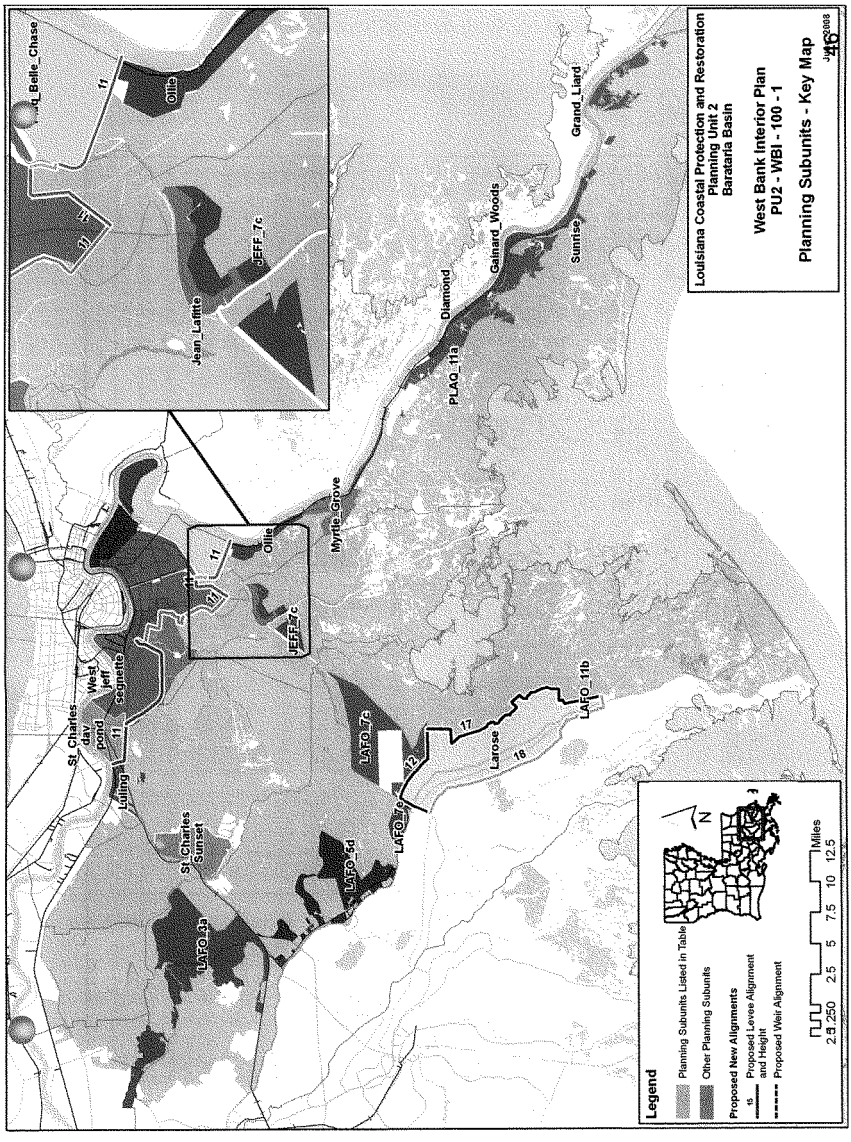
Other Results			Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Construction Time (years)		6	After 50 yrs (% of baseline)	103	99	103	99
Direct Wetland Impacts (acres)		0	After 100 yrs (% of baseline)	110	104	110	104
Indirect Impacts (unitless)		2	Present Value of Life Cycle Costs ($ Millions)				
Spatial Integrity (unitless)		0.36	Coastal Component	15,657	15,689	15,657	15,689
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)	Nonstructural Component	0	0	0	0
	1 / 2	5,858 5,877	Structural Component	999	1,024	999	1,024
	3 / 4	5,858 5,877	Total Project	16,656	16,713	16,656	16,713

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 2
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		Structural Plan
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	West Bank Alt
10-year	1,583	1,805	2,834	3,062	1,512	1,692	2,129	2,316	100-year Design
100-year	46,652	6,102	49,467	8,100	37,218	4,903	39,133	6,416	
400-year	51,671	40,302	53,124	41,377	40,614	33,950	41,659	34,622	
1,000-year	53,208	44,147	54,188	45,034	41,777	36,705	42,556	37,239	
2,000-year	53,965	45,405	54,716	46,123	42,386	37,560	42,963	38,001	

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels.


Donaldsonville
Gramercy
Vacherie
Napoleonville
Lac des Allemands
Boutte
Lake Pontchartrain
New Orleans
Lake Borgne
Avondale
Westwego
Gretna
Belle Chasse
Des Allemands
Thibodaux
Raceland
Lake Salvador
Oakville
Lafitte
Lockport
Houma
Larose
Cut Off
Little Lake
Galliano
Golden Meadow
Legend
Primary Roads
Planning Unit Boundary
New Sector Gate
Authorized Levee
N
Miles
2 1 0 2 4 6 8 10
Louisiana Coastal Protection and Restoration
Planning Unit 2
Barataria Basin
West Bank Interior Plan
PU2 - WBI - 100 - 1
(100-Year Design Level)
November 2007

1797


Louisiana Coastal Protection and Restoration
Planning Unit 2
Barataria Basin
West Bank Interior Plan
PU2 - WBI - 100 - 1
Planning Subunits - Key Map
Legend
Planning Subunits Listed in Table
Other Planning Subunits
Proposed New Alignments
Proposed Levee Alignment and Height
Proposed Weir Alignment
Miles
2.5 250 2.5 5 7.5 10 12.5
N
Belle_Chase
Ollie
JEFF_7c
Jean_Lafitte
Grand_Liard
Gainard_Woods
Sunrise
Diamond
PLAQ_11a
Myrtle_Grove
West jeff segnette
St Charles dav pond
Luling
St Charles Sunset
LAFO_3a
LAFO_5d
LAFO_7c
LAFO_7e
Larose
LAFO_11b
11
12
17
18

Alternative: PU2-WBI-100-1

Water Surface Elevations (feet - NAVD88 2004.65)

Planning Sub Unit	2010 (Base) Conditions						2060 (Future) Conditions					
	100-yr Event		400-year Event		1,000-yr Event		100-yr Event		400-year Event		1,000-yr Event	
	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project
Algiers	-3.8	-3.9	10.7	-3.9	12.1	-3.9	12.9	-3.9	16.3	-3.9	17.9	-3.9
Diamond	13.0	13.0	16.7	16.7	18.9	18.9	16.2	16.2	26.3	19.9	30.2	22.1
English_Turn	-1.7	-1.7	10.7	-1.7	12.1	-1.7	12.9	-1.7	16.3	-1.7	17.9	-1.7
Gainard_Woods	13.5	13.5	17.3	17.3	19.7	19.7	16.7	16.7	20.5	20.5	22.9	22.9
Grand_Liard	15.0	15.0	16.7	16.7	18.9	18.9	18.2	18.2	26.3	19.9	30.2	22.1
Jean_Lafitte	8.4	8.4	11.9	11.9	14.0	14.0	13.0	11.6	16.9	15.1	19.3	17.2
JEFF_7a	7.7	7.7	10.8	10.8	13.1	13.1	12.8	10.9	17.1	14.0	18.2	16.3
JEFF_7c	8.4	8.4	11.9	11.9	14.0	14.0	22.7	11.6	27.6	15.1	30.0	17.2
LAFO_11b	11.6	11.6	14.5	14.5	16.1	16.1	14.4	14.8	16.9	17.7	18.4	19.3
LAFO_3a	3.9	3.9	5.1	5.1	6.0	6.0	7.0	7.1	8.2	8.3	9.0	9.2
LAFO_5d	5.8	5.8	8.7	8.7	10.9	10.9	10.6	9.0	13.4	11.9	15.1	14.1
LAFO_7c	7.1	7.1	9.1	9.1	10.3	10.3	12.0	10.3	14.2	12.3	15.4	13.5
LAFO_7e	8.1	8.1	11.3	11.3	13.4	13.4	12.5	11.3	15.3	14.5	17.3	16.6
Larose	-2.5	-2.5	9.0	9.0	12.0	12.0	15.0	-2.5	15.0	9.0	15.0	12.0
Luling	6.1	6.1	8.6	8.6	10.2	10.2	11.8	11.2	15.5	13.7	17.4	15.3
Myrtle_Grove	10.3	10.3	13.8	13.8	15.7	15.7	13.5	13.5	17.3	17.0	18.6	18.9
Ollie	8.0	8.0	13.2	13.2	15.3	15.3	11.2	11.2	19.2	16.4	22.1	18.5
PLAQ_11a	12.5	12.5	16.7	16.7	18.9	18.9	15.9	15.7	20.5	19.9	22.9	22.1
Plaq_Belle_Chase	-2.6	-2.7	11.0	5.1	11.3	11.3	11.6	-2.7	14.3	5.1	15.8	11.3
St_Charles_dav_pond	1.6	1.6	4.8	4.8	11.0	11.0	11.0	1.6	13.2	4.8	14.5	11.0
St_Charles_Sunset	7.0	7.0	9.4	9.4	10.7	10.7	10.0	10.2	12.3	12.6	13.7	13.9
Sunrise	15.0	15.0	16.7	16.7	18.9	18.9	18.2	18.2	26.3	19.9	30.2	22.1
West_jeff_ames	-1.5	-1.5	11.0	11.0	11.3	11.3	11.6	-1.5	14.3	11.0	15.8	11.3
West_jeff_EoH	-3.5	-3.6	11.0	11.0	11.3	11.3	11.6	-3.6	14.3	11.0	15.8	11.3
West_jeff_harvey	-2.4	-2.4	11.0	11.0	11.3	11.3	11.6	-2.4	14.3	11.0	15.8	11.3
West_jeff_segnette	-3.9	-3.9	11.0	11.0	11.3	11.3	11.6	-3.9	14.3	11.0	15.8	11.3

Evaluation Parameters				
	Confidence Level:	90%	Levee Design:	No Friction Waves
	Future Relative Sea Level Rise:	3.2 feet	Levee Overtopping:	No Friction Waves

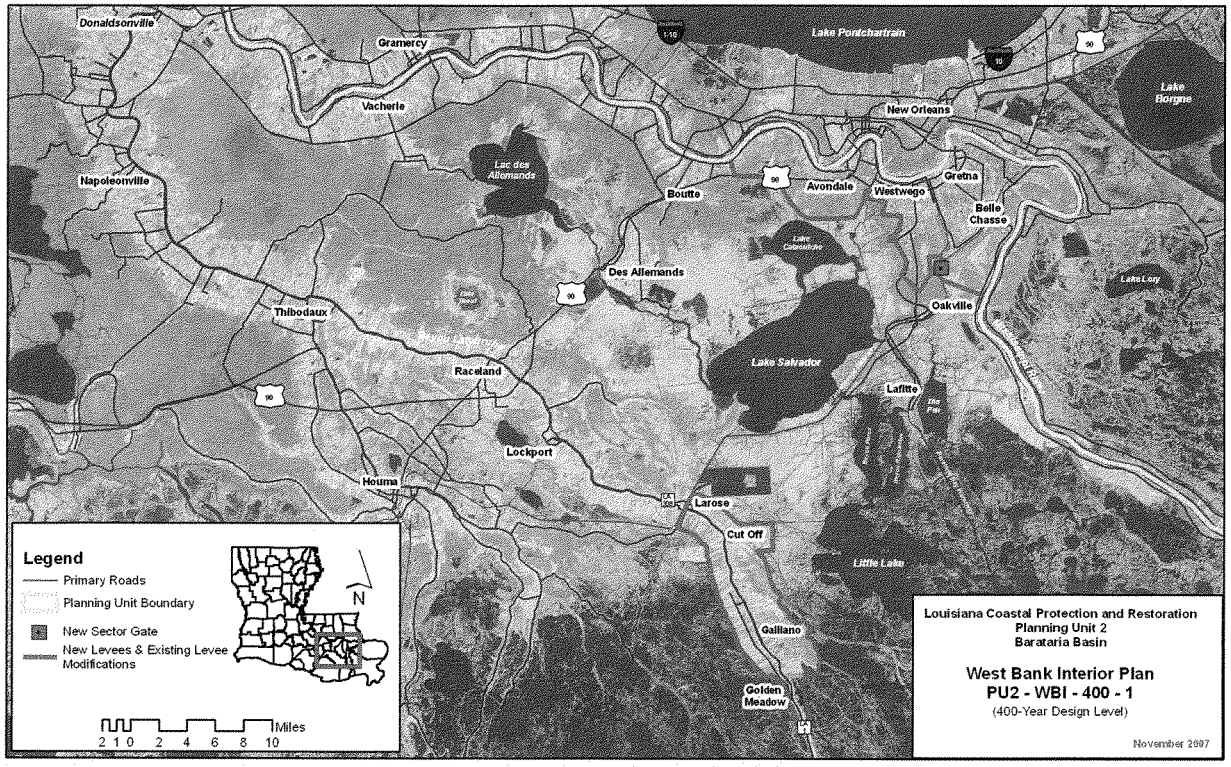
Planning Unit	2	Alt. No.:	PU2 I-400-1	Category:	Coastal Restoration + Structural Measures
Alternative Description:	Sustain coastal landscape through restoration. Construct new sector gate on Bayou Barataria to reduce risk on the West Bank. Raise West Bank and Vicinity and Larose to Golden Meadow levees to 400-year level of risk reduction.				
Coastal Component:	R2 (pulsed diversions)		Nonstructural Component:		None
Structural Component:	See alternative description above.				

Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	1,734	15,882	387	647	1,431	101	266	26	9
		Mid		19,334	754	1,194	3,024	214	213	26	9
		Low		20,472	944	1,487	3,660	251	160	25	8
2	High RSLR High Employment Dispersed Population	High	1,737	16,705	537	923	2,160	169	266	26	9
		Mid		19,651	833	1,301	3,181	231	213	25	9
		Low		20,669	1,023	1,596	3,836	271	160	23	8
3	Low RSLR Business-as-Usual Compact Population	High	1,734	11,124	366	604	1,349	92	266	26	9
		Mid		14,215	697	1,022	2,678	178	213	26	9
		Low		15,397	867	1,278	3,220	209	160	25	8
4	High RSLR Business-as-Usual Compact Population	High	1,737	11,752	480	833	1,866	141	266	26	9
		Mid		14,412	755	1,154	2,842	197	213	25	9
		Low		15,481	919	1,412	3,349	226	160	23	8

Other Results			Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Construction Time (years)		12	After 50 yrs (% of baseline)	103	99	103	99
Direct Wetland Impacts (acres)		3,700	After 100 yrs (% of baseline)	110	104	110	104
Indirect Impacts (unitless)		2	Present Value of Life Cycle Costs ($ Millions)				
Spatial Integrity (unitless)		0.36	Coastal Component	15,657	15,689	15,657	15,689
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)	Nonstructural Component	0	0	0	0
	1 / 2	12,464	Structural Component	18,294	18,319	18,294	18,319
	3 / 4	12,464	Total Project	33,951	34,008	33,951	34,008

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 2
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		Structural Plan
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	West Bank Alt
10-year	1,583	1,805	2,834	3,062	1,512	1,692	2,129	2,316	400-year Design
100-year	46,652	6,097	49,467	8,094	37,218	4,897	39,133	6,410	
400-year	51,671	9,802	53,124	10,877	40,614	7,207	41,659	7,879	
1,000-year	53,208	15,047	54,188	15,934	41,777	11,652	42,556	12,186	
2,000-year	53,965	33,812	54,716	34,531	42,386	28,473	42,963	28,914	

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels.


Donaldsonville
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Lake Pontchartrain
Lake Borgne
Vacherie
New Orleans
Napoleonville
Lac des Allemands
Boutte
Avondale
Westwego
Gretna
Belle Chasse
Des Allemands
Lake Cataouatche
Lake Lery
Thibodaux
Oakville
Raceland
Lake Salvador
Lafitte
Lockport
Houma
Larose
Cut Off
Little Lake
Galliano
Golden Meadow
Legend
Primary Roads
Planning Unit Boundary
New Sector Gate
New Levees & Existing Levee Modifications
N
Miles
2 1 0 2 4 6 8 10
Louisiana Coastal Protection and Restoration
Planning Unit 2
Barataria Basin
West Bank Interior Plan
PU2 - WBI - 400 - 1
(400-Year Design Level)
November 2007

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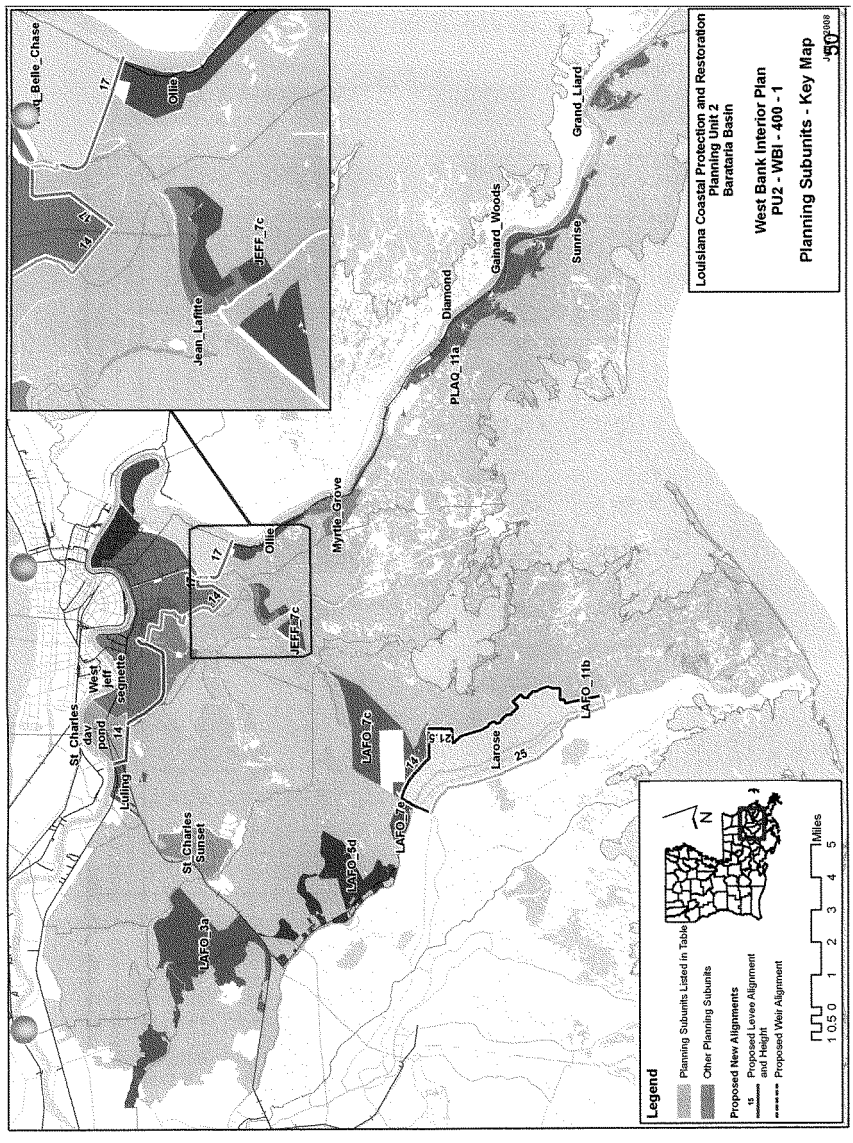

Louisiana Coastal Protection and Restoration
Planning Unit 2
Barataria Basin
West Bank Interior Plan
PU2 - WBI - 400 - 1
Planning Subunits - Key Map
Legend
Planning Subunits Listed in Table
Other Planning Subunits
Proposed New Alignments
Proposed Levee Alignment and Height
Proposed Weir Alignment
Miles
1 0.5 0 1 2 3 4 5
N
Jean_Lafitte
JEFF_7c
Ollie
Myrtle_Grove
PLAQ_11a
Diamond
Gainard_Woods
Sunrise
Grand_Liard
LAFO_11b
Larose
LAFO_7c
LAFO_7e
LAFO_5d
LAFO_3a
St_Charles Sunset
St_Charles dav pond
West jeff segnette
Luling
14
17
21.5
25

Alternative: PU2-WBI-400-1

Water Surface Elevations (feet - NAVD88 2004.65)

Planning Sub Unit	2010 (Base) Conditions						2060 (Future) Conditions					
	100-yr Event		400-year Event		1,000-yr Event		100-yr Event		400-year Event		1,000-yr Event	
	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project
Algiers	-3.8	-3.9	10.7	-3.9	12.1	-3.9	12.9	-3.9	16.3	-3.9	17.9	-3.9
Diamond	13.0	13.0	16.7	16.7	18.9	18.9	16.2	16.2	26.3	19.9	30.2	22.1
English_Turn	-1.7	-1.7	10.7	-1.7	12.1	-1.7	12.9	-1.7	16.3	-1.7	17.9	-1.7
Gainard_Woods	13.5	13.5	17.3	17.3	19.7	19.7	16.7	16.7	20.5	20.5	22.9	22.9
Grand_Liard	15.0	15.0	16.7	16.7	18.9	18.9	18.2	18.2	26.3	19.9	30.2	22.1
Jean_Lafitte	8.4	8.4	11.9	11.9	14.0	14.0	13.0	11.6	16.9	15.1	19.3	17.2
JEFF_7a	7.7	7.7	10.8	10.8	13.1	13.1	12.8	10.9	17.1	14.0	18.2	16.3
JEFF_7c	8.4	8.4	11.9	11.9	14.0	14.0	22.7	11.6	27.6	15.1	30.0	17.2
LAFO_11b	11.6	11.6	14.5	14.5	16.1	16.1	14.4	14.8	16.9	17.7	18.4	19.3
LAFO_3a	3.9	3.9	5.1	5.1	6.0	6.0	7.0	7.1	8.2	8.3	9.0	9.2
LAFO_5d	5.8	5.8	8.7	8.7	10.9	10.9	10.6	9.0	13.4	11.9	15.1	14.1
LAFO_7c	7.1	7.1	9.1	9.1	10.3	10.3	12.0	10.3	14.2	12.3	15.4	13.5
LAFO_7e	8.1	8.1	11.3	11.3	13.4	13.4	12.5	11.3	15.3	14.5	17.3	16.6
Larose	-2.5	-2.9	9.0	-2.3	12.0	-0.5	15.0	-2.9	15.0	-2.3	15.0	-0.5
Luling	6.1	6.1	8.6	8.6	10.2	10.2	11.8	11.2	15.5	13.7	17.4	15.3
Myrtle_Grove	10.3	10.3	13.8	13.8	15.7	15.7	13.5	13.5	17.3	17.0	18.6	18.9
Ollie	8.0	8.0	13.2	13.2	15.3	15.3	11.2	11.2	19.2	16.4	22.1	18.5
PLAQ_11a	12.5	12.5	16.7	16.7	18.9	18.9	15.9	15.7	20.5	19.9	22.9	22.1
Plaq_Belle_Chase	-2.6	-2.8	11.0	-2.6	11.3	-1.8	11.6	-2.8	14.3	-2.6	15.8	-1.8
St_Charles_dav_pond	1.6	1.5	4.8	1.7	11.0	2.7	11.0	1.5	13.2	1.7	14.5	2.7
St_Charles_Sunset	7.0	7.0	9.4	9.4	10.7	10.7	10.0	10.2	12.3	12.6	13.7	13.9
Sunrise	15.0	15.0	16.7	16.7	18.9	18.9	18.2	18.2	26.3	19.9	30.2	22.1
West_jeff_ames	-1.5	-1.5	11.0	-0.3	11.3	5.0	11.6	-1.5	14.3	-0.3	15.8	5.0
West_jeff_EoH	-3.5	-3.7	11.0	-3.6	11.3	-3.4	11.6	-3.7	14.3	-3.6	15.8	-3.4
West_jeff_harvey	-2.4	-2.5	11.0	-2.2	11.3	1.8	11.6	-2.5	14.3	-2.2	15.8	1.8
West_jeff_segnette	-3.9	-4.0	11.0	-3.8	11.3	-1.0	11.6	-4.0	14.3	-3.8	15.8	-1.0
Evaluation Parameters	Confidence Level:			90%		Levee Design:			No Friction Waves			
	Future Relative Sea Level Rise:			3.2 feet		Levee Overtopping:			No Friction Waves			

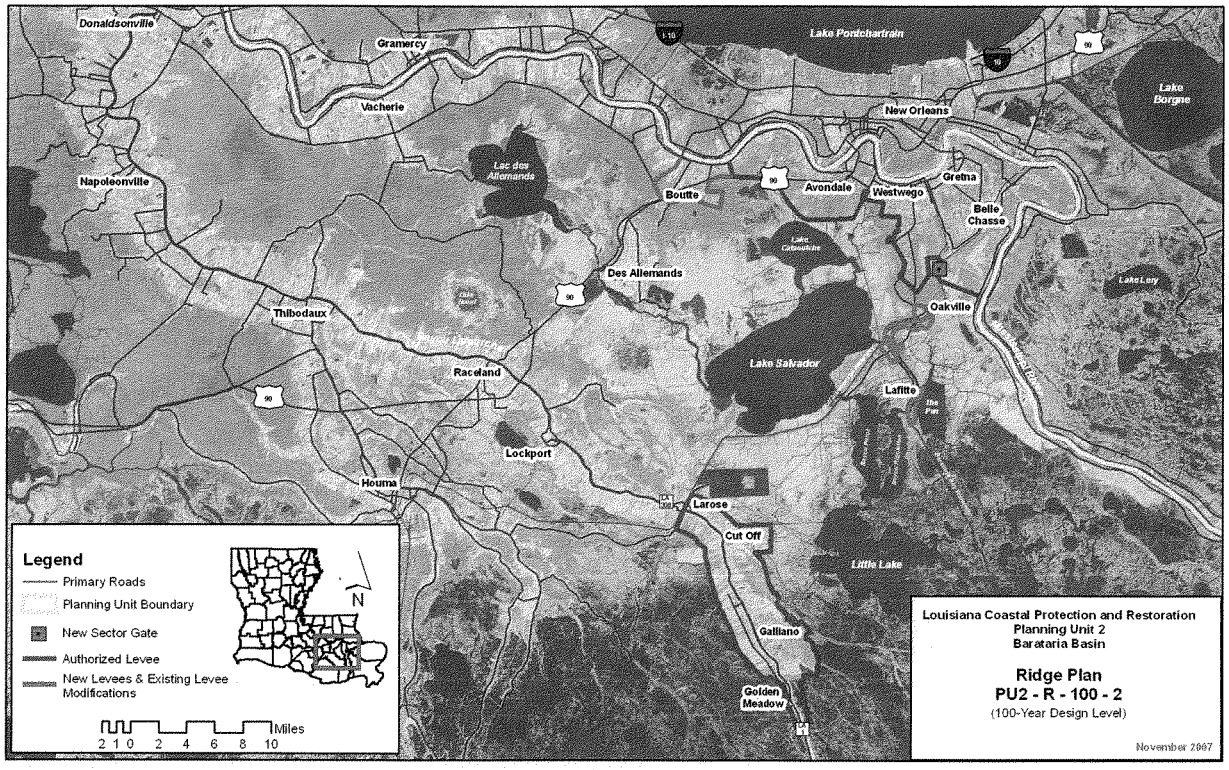
Planning Unit	2	Alt. No.:	PU. 100-2	Category:	Coastal Restoration + Structural Measures
Alternative Description:	Sustain coastal landscape through restoration. Construct new sector gate on Bayou Barataria to reduce risk on the West Bank. Extend West Bank and Vicinity levees to Boutte and construct/raise Lafitte ring levees to 100-year level of risk reduction.				
Coastal Component:	R2 (pulsed diversions)		Nonstructural Component:		None
Structural Component:	See alternative description above.				

Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	1,194	14,816	357	610	1,313	92	449	17	8
		Mid		18,681	744	1,178	2,977	209	266	15	7
		Low		20,398	1,017	1,585	4,056	272	160	14	6
2	High RSLR High Employment Dispersed Population	High	1,198	15,543	484	856	1,941	153	449	15	7
		Mid		18,975	809	1,234	3,075	218	266	14	7
		Low		20,576	1,083	1,644	4,180	286	160	13	6
3	Low RSLR Business-as-Usual Compact Population	High	1,194	10,055	335	558	1,214	82	449	17	8
		Mid		13,558	687	964	2,595	170	266	15	7
		Low		15,244	936	1,310	3,510	221	160	14	6
4	High RSLR Business-as-Usual Compact Population	High	1,198	10,584	429	731	1,619	121	449	15	7
		Mid		13,716	732	1,012	2,671	177	266	14	7
		Low		15,321	975	1,359	3,565	227	160	13	6

Other Results			Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Construction Time (years)		11	After 50 yrs (% of baseline)	103	99	103	99
Direct Wetland Impacts (acres)		700	After 100 yrs (% of baseline)	110	104	110	104
Indirect Impacts (unitless)		4	Present Value of Life Cycle Costs ($ Millions)				
Spatial Integrity (unitless)		0.36	Coastal Component	15,657	15,689	15,657	15,689
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)	Nonstructural Component	0	0	0	0
	1 / 2	8,306	Structural Component	7,730	7,770	7,730	7,770
	3 / 4	8,306	Total Project	23,386	23,459	23,386	23,459

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 2
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		Structural Plan
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	Ridge Alt
10-year	1,583	1,155	2,834	2,154	1,512	1,039	2,129	1,404	100-year Design
100-year	46,652	4,924	49,467	6,496	37,218	3,728	39,133	4,848	
400-year	51,671	39,518	53,124	40,414	40,614	33,221	41,659	33,699	
1,000-year	53,208	43,310	54,188	44,076	41,777	35,876	42,556	36,271	
2,000-year	53,965	44,520	54,716	45,136	42,386	36,663	42,963	36,985	

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels.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Gramercy
Lake Pontchartrain
Lake Borgne
Vacherie
New Orleans
Napoleonville
Lac des Allemands
Boutte
Avondale
Westwego
Gretna
Belle Chasse
Des Allemands
Thibodaux
Oakville
Lake Salvador
Raceland
Lafitte
Lockport
Houma
Larose
Cut Off
Little Lake
Galliano
Golden Meadow
Legend
Primary Roads
Planning Unit Boundary
New Sector Gate
Authorized Levee
New Levees & Existing Levee Modifications
N
2 1 0 2 4 6 8 10
Miles
Louisiana Coastal Protection and Restoration
Planning Unit 2
Barataria Basin
Ridge Plan
PU2 - R - 100 - 2
(100-Year Design Level)
November 2007

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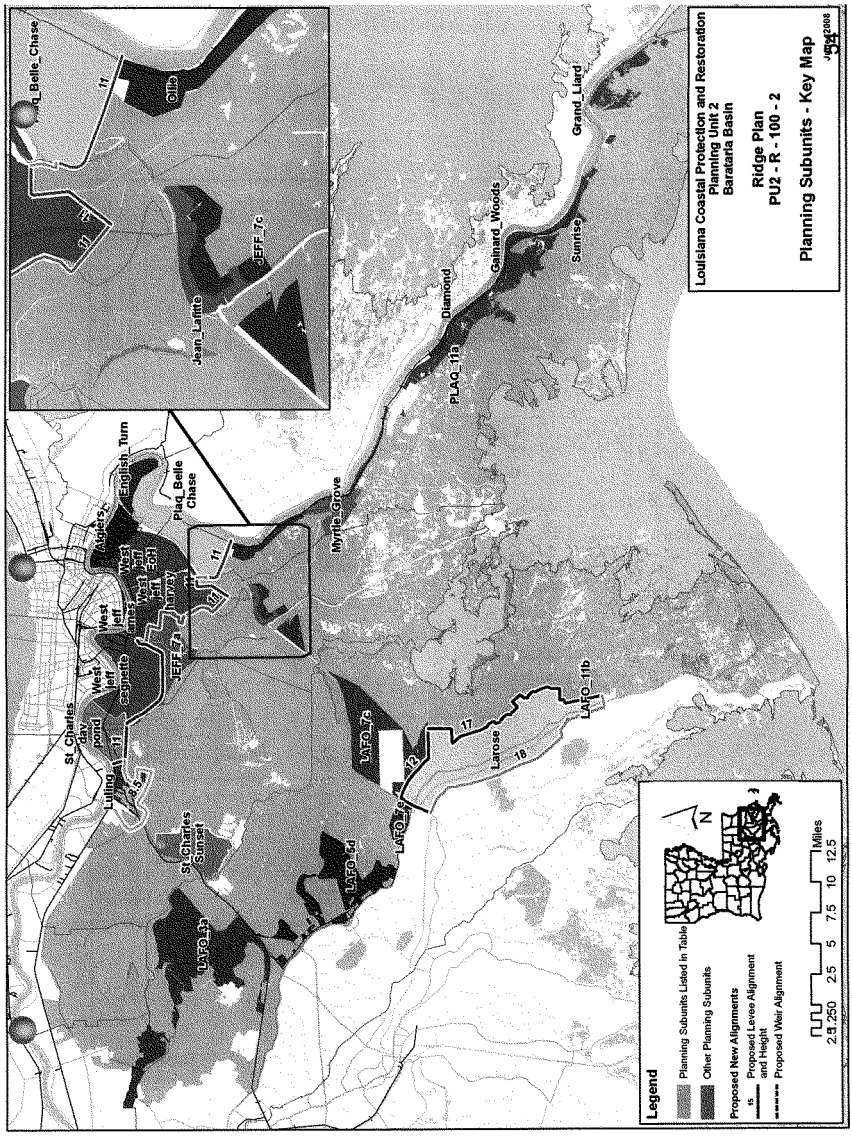

Louisiana Coastal Protection and Restoration
Planning Unit 2
Barataria Basin
Ridge Plan
PU2 - R - 100 - 2
Planning Subunits - Key Map
Legend
Planning Subunits Listed in Table
Other Planning Subunits
Proposed New Alignments
Proposed Levee Alignment and Height
Proposed Weir Alignment
Miles
2.5 1.250 2.5 5 7.5 10 12.5
N
Jean_Lafitte
JEFF_7c
Ollie
Plaq_Belle_Chase
English_Turn
Algiers
West Jeff EcH
West Jeff harvey
West Jeff James
West Jeff segnette
JEFF_7a
St_Charles day pond
Luling
St_Charles Sunset
LAFO_3a
LAFO_5d
LAFO_7e
LAFO_7c
Myrtle_Grove
PLAQ_11a
Diamond
Gainard_Woods
Sunrise
Grand_Liard
Larose
LAFO_11b
11
12
17
18
8.5

Alternative: PU2-R-100-2

Water Surface Elevations (feet - NAVD88 2004.65)

Planning Sub Unit	2010 (Base) Conditions						2060 (Future) Conditions					
	100-yr Event		400-year Event		1,000-yr Event		100-yr Event		400-year Event		1,000-yr Event	
	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project
Algiers	-3.8	-3.9	10.7	-3.9	12.1	-3.9	12.9	-3.9	16.3	-3.9	17.9	-3.9
Diamond	13.0	13.0	16.7	16.7	18.9	18.9	16.2	16.2	26.3	19.9	30.2	22.1
English_Turn	-1.7	-1.7	10.7	-1.7	12.1	-1.7	12.9	-1.7	16.3	-1.7	17.9	-1.7
Gainard_Woods	13.5	13.5	17.3	17.3	19.7	19.7	16.7	16.7	20.5	20.5	22.9	22.9
Grand_Liard	15.0	15.0	16.7	16.7	18.9	18.9	18.2	18.2	26.3	19.9	30.2	22.1
Jean_Lafitte	8.4	8.4	11.9	11.9	14.0	14.0	13.0	11.6	16.9	15.1	19.3	17.2
JEFF_7a	7.7	7.7	10.8	10.8	13.1	13.1	12.8	10.9	17.1	14.0	18.2	16.3
JEFF_7c	8.4	8.4	11.9	11.9	14.0	14.0	22.7	11.6	27.6	15.1	30.0	17.2
LAFO_11b	11.6	11.6	14.5	14.5	16.1	16.1	14.4	14.8	16.9	17.7	18.4	19.3
LAFO_3a	3.9	3.9	5.1	5.1	6.0	6.0	7.0	7.1	8.2	8.3	9.0	9.2
LAFO_5d	5.8	5.8	8.7	8.7	10.9	10.9	10.6	9.0	13.4	11.9	15.1	14.1
LAFO_7c	7.1	7.1	9.1	9.1	10.3	10.3	12.0	10.3	14.2	12.3	15.4	13.5
LAFO_7e	8.1	8.1	11.3	11.3	13.4	13.4	12.5	11.3	15.3	14.5	17.3	16.6
Larose	-2.5	-2.5	9.0	9.0	12.0	12.0	15.0	-2.5	15.0	9.0	15.0	12.0
Luling	6.1	2.2	8.6	8.1	10.2	8.5	11.8	2.2	15.5	8.1	17.4	8.5
Myrtle_Grove	10.3	10.3	13.8	13.8	15.7	15.7	13.5	13.5	17.3	17.0	18.6	18.9
Ollie	8.0	8.0	13.2	13.2	15.3	15.3	11.2	11.2	19.2	16.4	22.1	18.5
PLAQ_11a	12.5	12.5	16.7	16.7	18.9	18.9	15.9	15.7	20.5	19.9	22.9	22.1
Plaq_Belle_Chase	-2.6	-2.7	11.0	5.1	11.3	11.3	11.6	-2.7	14.3	5.1	15.8	11.3
St_Charles_dav_pond	1.6	1.6	4.8	4.8	11.0	11.0	11.0	1.6	13.2	4.8	14.5	11.0
St_Charles_Sunset	7.0	7.0	9.4	9.4	10.7	10.7	10.0	10.2	12.3	12.6	13.7	13.9
Sunrise	15.0	15.0	16.7	16.7	18.9	18.9	18.2	18.2	26.3	19.9	30.2	22.1
West_jeff_ames	-1.5	-1.5	11.0	11.0	11.3	11.3	11.6	-1.5	14.3	11.0	15.8	11.3
West_jeff_EoH	-3.5	-3.6	11.0	11.0	11.3	11.3	11.6	-3.6	14.3	11.0	15.8	11.3
West_jeff_harvey	-2.4	-2.4	11.0	11.0	11.3	11.3	11.6	-2.4	14.3	11.0	15.8	11.3
West_jeff_segnette	-3.9	-3.9	11.0	11.0	11.3	11.3	11.6	-3.9	14.3	11.0	15.8	11.3
Evaluation Parameters	Confidence Level:			90%		Levee Design:			No Friction Waves			
	Future Relative Sea Level Rise:			3.2 feet		Levee Overtopping:			No Friction Waves			

Planning Unit	2	Alt. No.:	PU 400-2	Category:	Coastal Restoration + Structural Measures
Alternative Description:	Sustain coastal landscape through restoration. Construct new sector gate on Bayou Barataria to reduce risk on the West Bank. Extend West Bank and Vicinity levees to Boutte and raise those levees as well as Larose to Golden Meadow levees to 400-year level				
Coastal Component:	R2 (pulsed diversions)	Nonstructural Component:	None		
Structural Component:	See alternative description above.				

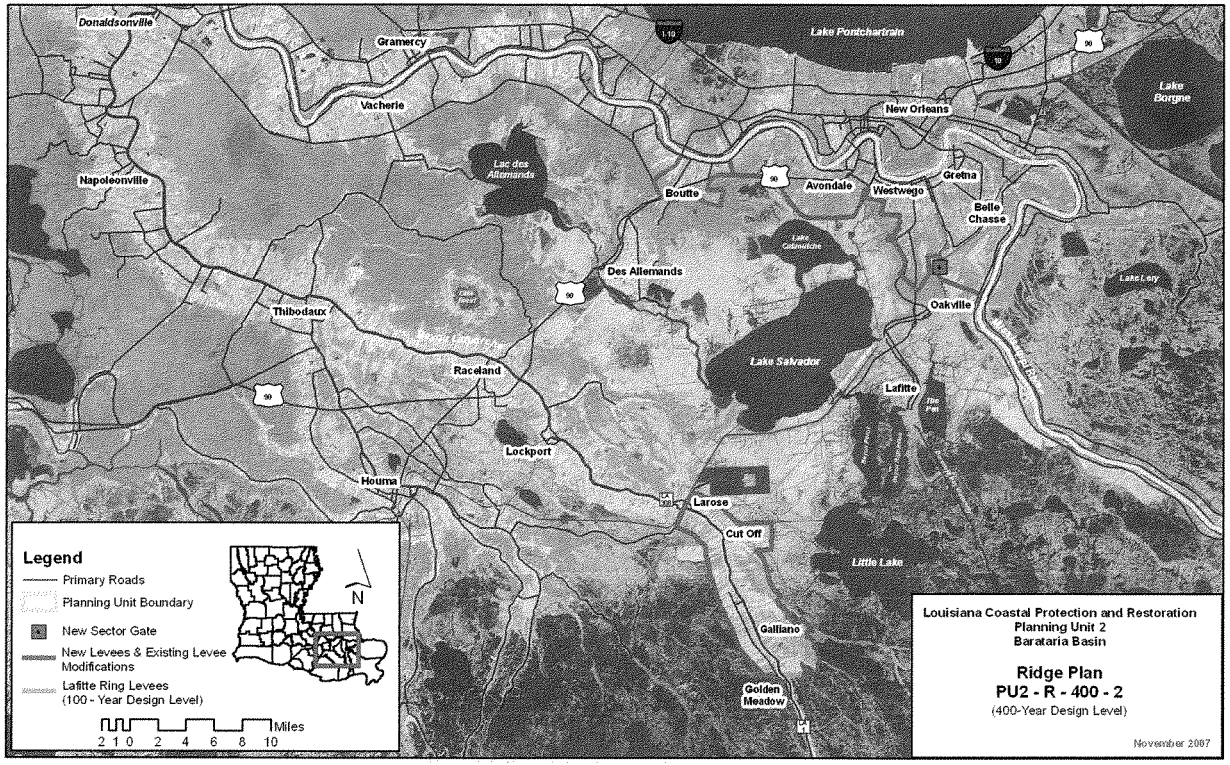
Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	2,097	14,989	370	639	1,378	99	266	26	9
		Mid		18,421	741	1,206	2,984	216	213	26	9
		Low		19,489	916	1,458	3,570	246	160	25	8
2	High RSLR High Employment Dispersed Population	High	2,104	15,857	520	923	2,120	170	266	26	9
		Mid		18,733	810	1,266	3,087	225	213	25	9
		Low		19,668	983	1,521	3,698	260	160	23	8
3	Low RSLR Business-as-Usual Compact Population	High	2,097	10,200	344	583	1,263	87	266	26	9
		Mid		13,242	677	985	2,559	173	213	26	9
		Low		14,331	831	1,195	3,034	196	160	25	8
4	High RSLR Business-as-Usual Compact Population	High	2,104	10,837	458	785	1,749	134	266	26	9
		Mid		13,411	726	1,038	2,642	181	213	25	9
		Low		14,409	871	1,249	3,095	203	160	23	8

Other Results			
Construction Time (years)		13	
Direct Wetland Impacts (acres)		4,400	
Indirect Impacts (unitless)		4	
Spatial Integrity (unitless)		0.36	
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)	
	1 / 2	14,963	15,011
	3 / 4	14,963	15,011

Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
After 50 yrs (% of baseline)	103	99	103	99
After 100 yrs (% of baseline)	110	104	110	104
Present Value of Life Cycle Costs ($ Millions)				
Coastal Component	15,657	15,689	15,657	15,689
Nonstructural Component	0	0	0	0
Structural Component	25,409	25,515	25,409	25,515
Total Project	41,066	41,204	41,066	41,204

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 2
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		Structural Plan
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	Ridge Alt
10-year	1,583	1,155	2,834	2,154	1,512	1,039	2,129	1,404	400-year Design
100-year	46,652	4,916	49,467	6,488	37,218	3,720	39,133	4,839	
400-year	51,671	7,969	53,124	8,865	40,614	5,405	41,659	5,883	
1,000-year	53,208	13,049	54,188	13,815	41,777	9,667	42,556	10,062	
2,000-year	53,965	32,054	54,716	32,670	42,386	26,735	42,963	27,057	

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels.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Lake Pontchartrain
Lake Borgne
Vacherie
New Orleans
Napoleonville
Lac des Allemands
Boutte
Avondale
Westwego
Gretna
Belle Chasse
Des Allemands
Lake Cataouatche
Lake Leoy
Thibodaux
Oakville
Raceland
Lake Salvador
Lafitte
Lockport
Houma
Larose
Cut Off
Little Lake
Galliano
Golden Meadow
Legend
Primary Roads
Planning Unit Boundary
New Sector Gate
New Levees & Existing Levee Modifications
Lafitte Ring Levees (100 - Year Design Level)
N
Miles
2 1 0 2 4 6 8 10
Louisiana Coastal Protection and Restoration
Planning Unit 2
Barataria Basin
Ridge Plan
PU2 - R - 400 - 2
(400-Year Design Level)
November 2007

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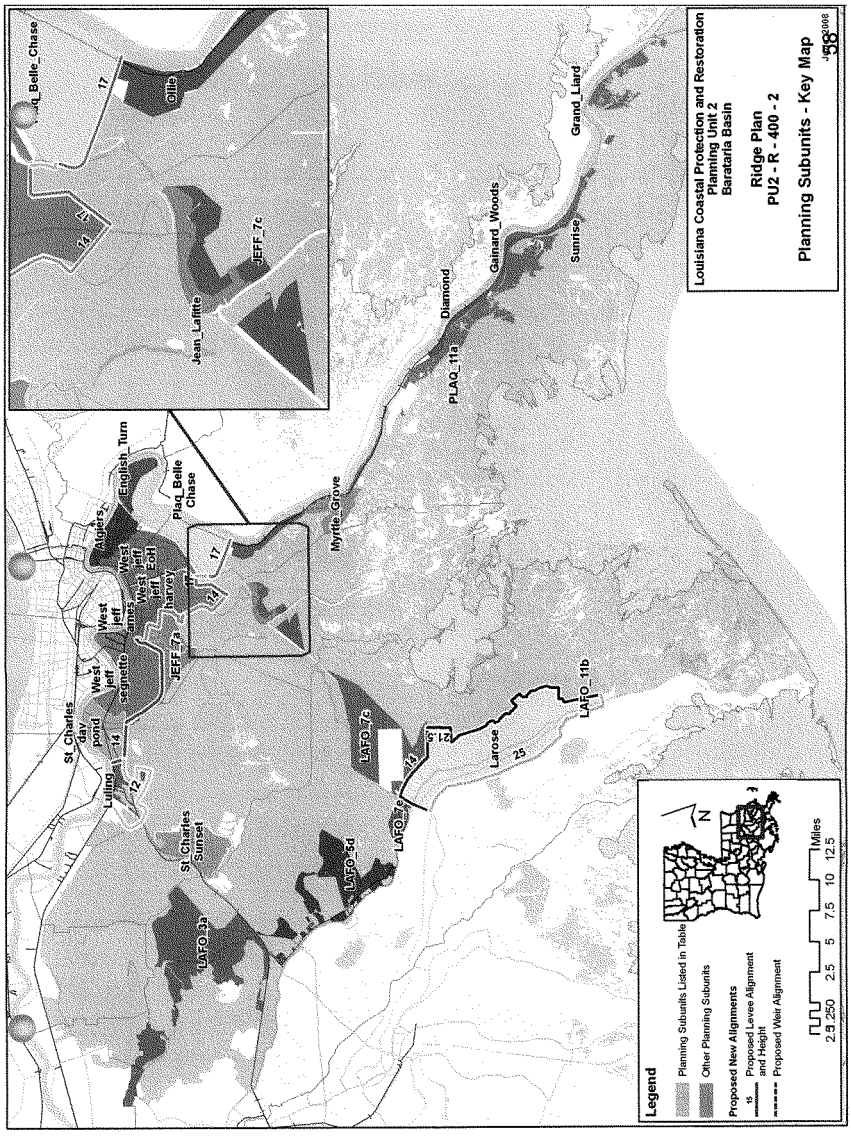
Louisiana Coastal Protection and Restoration
Planning Unit 2
Barataria Basin
Ridge Plan
PU2 - R - 400 - 2
Planning Subunits - Key Map
Legend
Planning Subunits Listed in Table
Other Planning Subunits
Proposed New Alignments
Proposed Levee Alignment and Height
Proposed Weir Alignment
Miles
2.5 250 2.5 5 7.5 10 12.5
N
Jean_Lafitte
JEFF_7c
Ollie
Plaq_Belle_Chase
English_Turn
Algiers
West jeff
EoH
harvey
West jeff ames
West jeff segnette
JEFF_7a
St_Charles day pond
Luling
St_Charles Sunset
LAFO_3a
LAFO_5d
LAFO_7e
LAFO_7c
Myrtle_Grove
Larose
LAFO_11b
PLAQ_11a
Diamond
Gainard_Woods
Sunrise
Grand_Liard

Alternative: PU2-R-400-2

Water Surface Elevations (feet - NAVD88 2004.65)

Planning Sub Unit	2010 (Base) Conditions						2060 (Future) Conditions					
	100-yr Event		400-year Event		1,000-yr Event		100-yr Event		400-year Event		1,000-yr Event	
	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project
Algiers	-3.8	-3.9	10.7	-3.9	12.1	-3.9	12.9	-3.9	16.3	-3.9	17.9	-3.9
Diamond	13.0	13.0	16.7	16.7	18.9	18.9	16.2	16.2	26.3	19.9	30.2	22.1
English_Turn	-1.7	-1.7	10.7	-1.7	12.1	-1.7	12.9	-1.7	16.3	-1.7	17.9	-1.7
Gainard_Woods	13.5	13.5	17.3	17.3	19.7	19.7	16.7	16.7	20.5	20.5	22.9	22.9
Grand_Liard	15.0	15.0	16.7	16.7	18.9	18.9	18.2	18.2	26.3	19.9	30.2	22.1
Jean_Lafitte	8.4	8.4	11.9	11.9	14.0	14.0	13.0	11.6	16.9	15.1	19.3	17.2
JEFF_7a	7.7	7.7	10.8	10.8	13.1	13.1	12.8	10.9	17.1	14.0	18.2	16.3
JEFF_7c	8.4	8.4	11.9	11.9	14.0	14.0	22.7	11.6	27.6	15.1	30.0	17.2
LAFO_11b	11.6	11.6	14.5	14.5	16.1	16.1	14.4	14.8	16.9	17.7	18.4	19.3
LAFO_3a	3.9	3.9	5.1	5.1	6.0	6.0	7.0	7.1	8.2	8.3	9.0	9.2
LAFO_5d	5.8	5.8	8.7	8.7	10.9	10.9	10.6	9.0	13.4	11.9	15.1	14.1
LAFO_7c	7.1	7.1	9.1	9.1	10.3	10.3	12.0	10.3	14.2	12.3	15.4	13.5
LAFO_7e	8.1	8.1	11.3	11.3	13.4	13.4	12.5	11.3	15.3	14.5	17.3	16.6
Larose	-2.5	-2.9	9.0	-2.3	12.0	-0.5	15.0	-2.9	15.0	-2.3	15.0	-0.5
Luling	6.1	1.5	8.6	2.1	10.2	3.6	11.8	1.5	15.5	2.1	17.4	3.6
Myrtle_Grove	10.3	10.3	13.8	13.8	15.7	15.7	13.5	13.5	17.3	17.0	18.6	18.9
Ollie	8.0	8.0	13.2	13.2	15.3	15.3	11.2	11.2	19.2	16.4	22.1	18.5
PLAQ_11a	12.5	12.5	16.7	16.7	18.9	18.9	15.9	15.7	20.5	19.9	22.9	22.1
Plaq_Belle_Chase	-2.6	-2.8	11.0	-2.6	11.3	-1.8	11.6	-2.8	14.3	-2.6	15.8	-1.8
St_Charles_dav_pond	1.6	1.5	4.8	1.7	11.0	2.7	11.0	1.5	13.2	1.7	14.5	2.7
St_Charles_Sunset	7.0	7.0	9.4	9.4	10.7	10.7	10.0	10.2	12.3	12.6	13.7	13.9
Sunrise	15.0	15.0	16.7	16.7	18.9	18.9	18.2	18.2	26.3	19.9	30.2	22.1
West_jeff_ames	-1.5	-1.5	11.0	-0.3	11.3	5.0	11.6	-1.5	14.3	-0.3	15.8	5.0
West_jeff_EoH	-3.5	-3.7	11.0	-3.6	11.3	-3.4	11.6	-3.7	14.3	-3.6	15.8	-3.4

West_jeff_harvey	-2.4	-2.5	11.0	-2.2	11.3	1.8	11.6	-2.5	14.3	-2.2	15.8	1.8
West_jeff_segnette	-3.9	-4.0	11.0	-3.8	11.3	-1.0	11.6	-4.0	14.3	-3.8	15.8	-1.0
Evaluation Parameters	Confidence Level:			90%		Levee Design:			No Friction Waves			
	Future Sea Level Rise:			3.2 feet		Levee Overtopping:			No Friction Waves			

Planning Unit:	2	Alt. No.:	PU2-R-100-3	Category:	Coastal Restoration + Structural Measures
Alternative Description:	Sustain coastal landscape through restoration. Construct new sector gate on Bayou Barataria to reduce risk on the West Bank. Extend West Bank and Vicinity levees to Boutte and construct/raise Lafitte and Des Allemands ring levees to 100-year level of risk				
Coastal Component:	R2 (pulsed diversions)		Nonstructural Component:		None
Structural Component:	See alternative description above.				

Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	1,318	13,925	341	591	1,260	89	449	17	7
		Mid		17,790	722	1,145	2,883	202	266	15	7
		Low		19,537	993	1,554	3,967	266	160	14	6
2	High RSLR High Employment Dispersed Population	High	1,322	14,652	463	826	1,860	147	449	15	7
		Mid		18,084	783	1,201	2,981	211	266	14	7
		Low		19,716	1,054	1,612	4,092	279	160	13	6
3	Low RSLR Business-as-Usual Compact Population	High	1,318	9,462	319	539	1,161	79	449	17	7
		Mid		12,955	668	938	2,525	166	266	15	7
		Low		14,663	914	1,285	3,442	217	160	14	6
4	High RSLR Business-as-Usual Compact Population	High	1,322	9,992	410	708	1,562	118	449	15	7
		Mid		13,113	709	986	2,601	173	266	14	7
		Low		14,740	949	1,333	3,497	223	160	13	6

Other Results			Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Construction Time (years)		11	After 50 yrs (% of baseline)	103	99	103	99
Direct Wetland Impacts (acres)		1,000	After 100 yrs (% of baseline)	110	104	110	104
Indirect Impacts (unitless)		4	Present Value of Life Cycle Costs ($ Millions)				
Spatial Integrity (unitless)		0.36	Coastal Component	15,657	15,689	15,657	15,689
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)	Nonstructural Component	0	0	0	0
	1 / 2	9,190	Structural Component	10,147	10,201	10,147	10,201
	3 / 4	9,190	Total Project	25,803	25,890	25,803	25,890

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)								
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4	
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj
10-year	1,583	1,012	2,834	1,931	1,512	892	2,129	1,146
100-year	46,652	4,440	49,467	5,799	37,218	3,382	39,133	4,356
400-year	51,671	38,985	53,124	39,790	40,614	32,964	41,659	33,401
1,000-year	53,208	42,957	54,188	43,656	41,777	35,733	42,556	36,100
2,000-year	53,965	44,131	54,716	44,688	42,386	36,509	42,963	36,809

Planning Unit 2

Structural Plan

Ridge Alt

100-year Design

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price leve'

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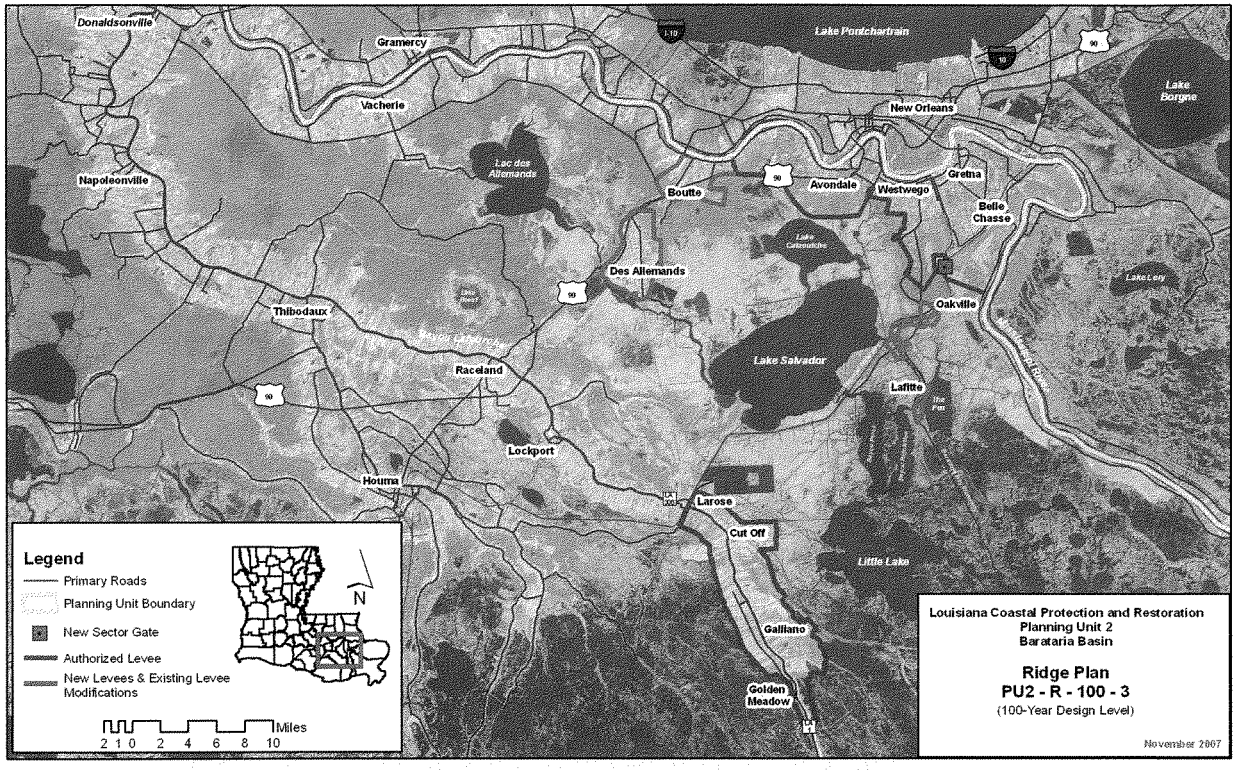
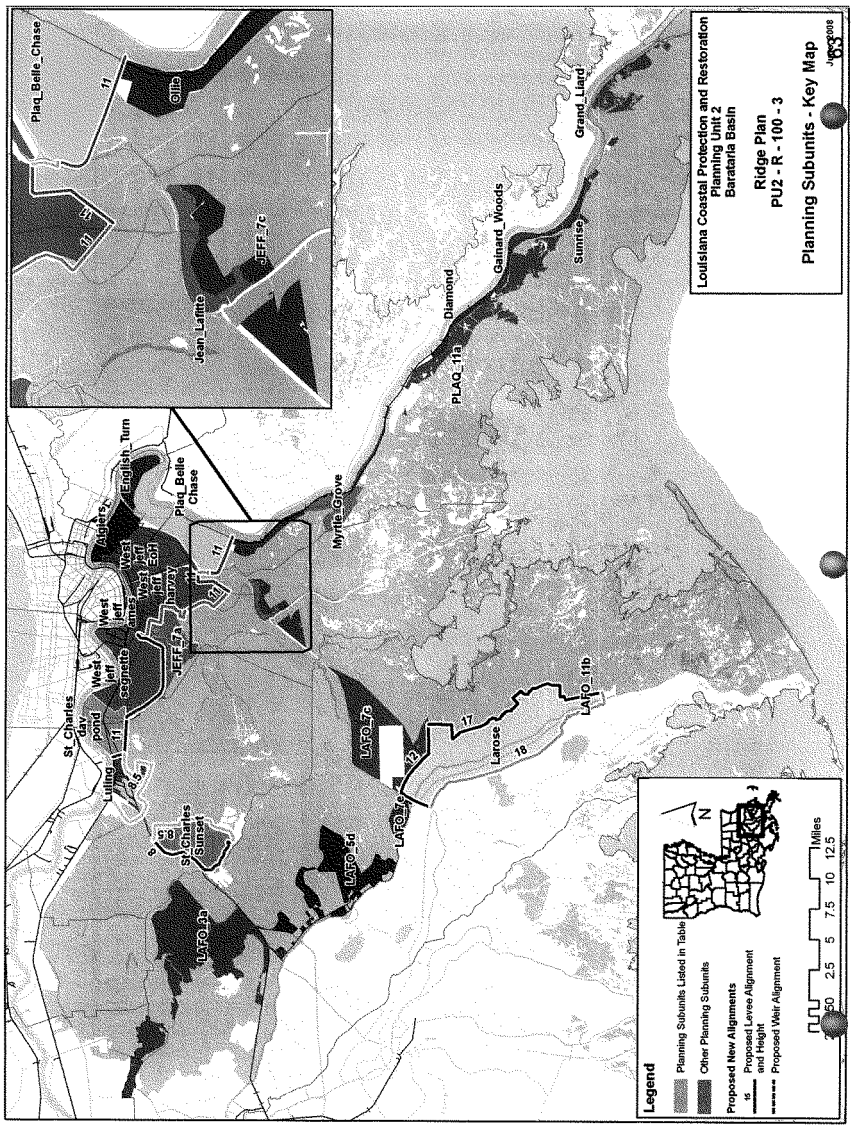

Donaldsonville
Gramercy
Vacherie
Napoleonville
Lac des Allemands
Lake Pontchartrain
New Orleans
Lake Borgne
Boutte
Avondale
Westwego
Gretna
Belle Chasse
Des Allemands
Thibodaux
Raceland
Lockport
Houma
Larose
Cut Off
Lake Salvador
Lake Cataouatche
Lake Leoy
Oakville
Lafitte
Little Lake
Galliano
Golden Meadow
Legend
Primary Roads
Planning Unit Boundary
New Sector Gate
Authorized Levee
New Levees & Existing Levee Modifications
N
Miles
2 1 0 2 4 6 8 10
Louisiana Coastal Protection and Restoration
Planning Unit 2
Barataria Basin
Ridge Plan
PU2 - R - 100 - 3
(100-Year Design Level)
November 2007


Louisiana Coastal Protection and Restoration
Planning Unit 2
Barataria Basin
Ridge Plan
PU2 - R - 100 - 3
Planning Subunits - Key Map
Legend
Planning Subunits Listed in Table
Other Planning Subunits
Proposed New Alignments
Proposed Levee Alignment and Height
Proposed Weir Alignment
Miles
Plaq_Belle_Chase
Jean_Lafitte
JEFF_7c
Grand_Liard
Gainard_Woods
Diamond
PLAQ_11a
Sunrise
Myrtle_Grove
English_Turn
Plaq_Belle Chase
Algiers
West jeff
EoH
harvey
West jeff
ames
West jeff
segnette
JEFF_7a
St_Charles
day pond
Luling
St_Charles Sunset
LAFO_3a
LAFO_5d
LAFO_7e
LAFO_7c
Larose
LAFO_11b

Alternative: PU2-R-100-3

Water Surface Elevations (feet - NAVD88 2004.65)

Planning Sub Unit	2010 (Base) Conditions						2060 (Future) Conditions					
	100-yr Event		400-year Event		1,000-yr Event		100-yr Event		400-year Event		1,000-yr Event	
	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project
Algiers	-3.8	-3.9	10.7	-3.9	12.1	-3.9	12.9	-3.9	16.3	-3.9	17.9	-3.9
Diamond	13.0	13.0	16.7	16.7	18.9	18.9	16.2	16.2	26.3	19.9	30.2	22.1
English_Turn	-1.7	-1.7	10.7	-1.7	12.1	-1.7	12.9	-1.7	16.3	-1.7	17.9	-1.7
Gainard_Woods	13.5	13.5	17.3	17.3	19.7	19.7	16.7	16.7	20.5	20.5	22.9	22.9
Grand_Liard	15.0	15.0	16.7	16.7	18.9	18.9	18.2	18.2	26.3	19.9	30.2	22.1
Jean_Lafitte	8.4	8.4	11.9	11.9	14.0	14.0	13.0	11.6	16.9	15.1	19.3	17.2
JEFF_7a	7.7	7.7	10.8	10.8	13.1	13.1	12.8	10.9	17.1	14.0	18.2	16.3
JEFF_7c	8.4	8.4	11.9	11.9	14.0	14.0	22.7	11.6	27.6	15.1	30.0	17.2
LAFO_11b	11.6	11.6	14.5	14.5	16.1	16.1	14.4	14.8	16.9	17.7	18.4	19.3
LAFO_3a	3.9	3.9	5.1	5.1	6.0	6.0	7.0	7.1	8.2	8.3	9.0	9.2
LAFO_5d	5.8	5.8	8.7	8.7	10.9	10.9	10.6	9.0	13.4	11.9	15.1	14.1
LAFO_7c	7.1	7.1	9.1	9.1	10.3	10.3	12.0	10.3	14.2	12.3	15.4	13.5
LAFO_7e	8.1	8.1	11.3	11.3	13.4	13.4	12.5	11.3	15.3	14.5	17.3	16.6
Larose	-2.5	-2.5	9.0	9.0	12.0	12.0	15.0	-2.5	15.0	9.0	15.0	12.0
Luling	6.1	2.2	8.6	8.1	10.2	8.5	11.8	2.2	15.5	8.1	17.4	8.5
Myrtle_Grove	10.3	10.3	13.8	13.8	15.7	15.7	13.5	13.5	17.3	17.0	18.6	18.9
Ollie	8.0	8.0	13.2	13.2	15.3	15.3	11.2	11.2	19.2	16.4	22.1	18.5
PLAQ_11a	12.5	12.5	16.7	16.7	18.9	18.9	15.9	15.7	20.5	19.9	22.9	22.1
Plaq_Belle_Chase	-2.6	-2.7	11.0	5.1	11.3	11.3	11.6	-2.7	14.3	5.1	15.8	11.3
St_Charles_dav_pond	1.6	1.6	4.8	4.8	11.0	11.0	11.0	1.6	13.2	4.8	14.5	11.0
St_Charles_Sunset	7.0	-4.7	9.4	5.7	10.7	8.5	10.0	-4.7	12.3	5.7	13.7	8.5
Sunrise	15.0	15.0	16.7	16.7	18.9	18.9	18.2	18.2	26.3	19.9	30.2	22.1
West_jeff_ames	-1.5	-1.5	11.0	11.0	11.3	11.3	11.6	-1.5	14.3	11.0	15.8	11.3
West_jeff_EoH	-3.5	-3.6	11.0	11.0	11.3	11.3	11.6	-3.6	14.3	11.0	15.8	11.3
West_jeff_harvey	-2.4	-2.4	11.0	11.0	11.3	11.3	11.6	-2.4	14.3	11.0	15.8	11.3
West_jeff_segnette	-3.9	-3.9	11.0	11.0	11.3	11.3	11.6	-3.9	14.3	11.0	15.8	11.3

Evaluation Parameters				
	Confidence Level:	90%	Levee Design:	No Friction Waves
	Future Relative Sea Level Rise:	3.2 feet	Levee Overtopping:	No Friction Waves

Planning Unit:	2	Alt. No.:	PU2-R-400-3	Category:	Coastal Restoration + Structural Measures
Alternative Description:	Sustain coastal landscape through restoration. Construct new sector gate on Bayou Barataria to reduce risk on the West Bank. Extend West Bank and Vicinity levees to Boutte and raise those levees as well as Des Allemands and Larose to Golden Meadow levees				
Coastal Component:	R2 (pulsed diversions)			Nonstructural Component:	None
Structural Component:	See alternative description above.				

Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	2,246	13,733	332	585	1,236	88	449	26	9
		Mid		16,883	660	1,070	2,611	185	266	26	9
		Low		17,898	821	1,316	3,173	214	160	25	8
2	High RSLR High Employment Dispersed Population	High	2,253	14,459	455	821	1,837	145	449	26	9
		Mid		17,177	720	1,126	2,710	194	266	25	9
		Low		18,076	881	1,375	3,298	228	160	23	8
3	Low RSLR Business-as-Usual Compact Population	High	2,246	9,265	310	533	1,135	78	449	26	9
		Mid		12,064	607	874	2,262	150	266	26	9
		Low		13,106	748	1,078	2,715	172	160	25	8
4	High RSLR Business-as-Usual Compact Population	High	2,253	9,795	402	702	1,536	117	449	26	9
		Mid		12,222	648	922	2,338	157	266	25	9
		Low		13,182	783	1,126	2,770	179	160	23	8

Other Results				Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Construction Time (years)			11	After 50 yrs (% of baseline)	103	99	103	99
Direct Wetland Impacts (acres)			4,700	After 100 yrs (% of baseline)	110	104	110	104
Indirect Impacts (unitless)			4	Present Value of Life Cycle Costs ($ Millions)				
Spatial Integrity (unitless)			0.36	Coastal Component	15,657	15,689	15,657	15,689
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)		Nonstructural Component	0	0	0	0
	1 / 2	15,965	16,019	Structural Component	28,318	28,440	28,318	28,440
	3 / 4	15,965	16,019	Total Project	43,975	44,128	43,975	44,128

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 2
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		Structural Plan
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	Ridge Alt
10-year	1,583	1,012	2,834	1,931	1,512	892	2,129	1,146	400-year Design
100-year	46,652	4,431	49,467	5,790	37,218	3,374	39,133	4,347	
400-year	51,671	7,165	53,124	7,970	40,614	4,850	41,659	5,287	
1,000-year	53,208	12,156	54,188	12,854	41,777	9,073	42,556	9,439	
2,000-year	53,965	31,126	54,716	31,684	42,386	26,134	42,963	26,433	

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price leve

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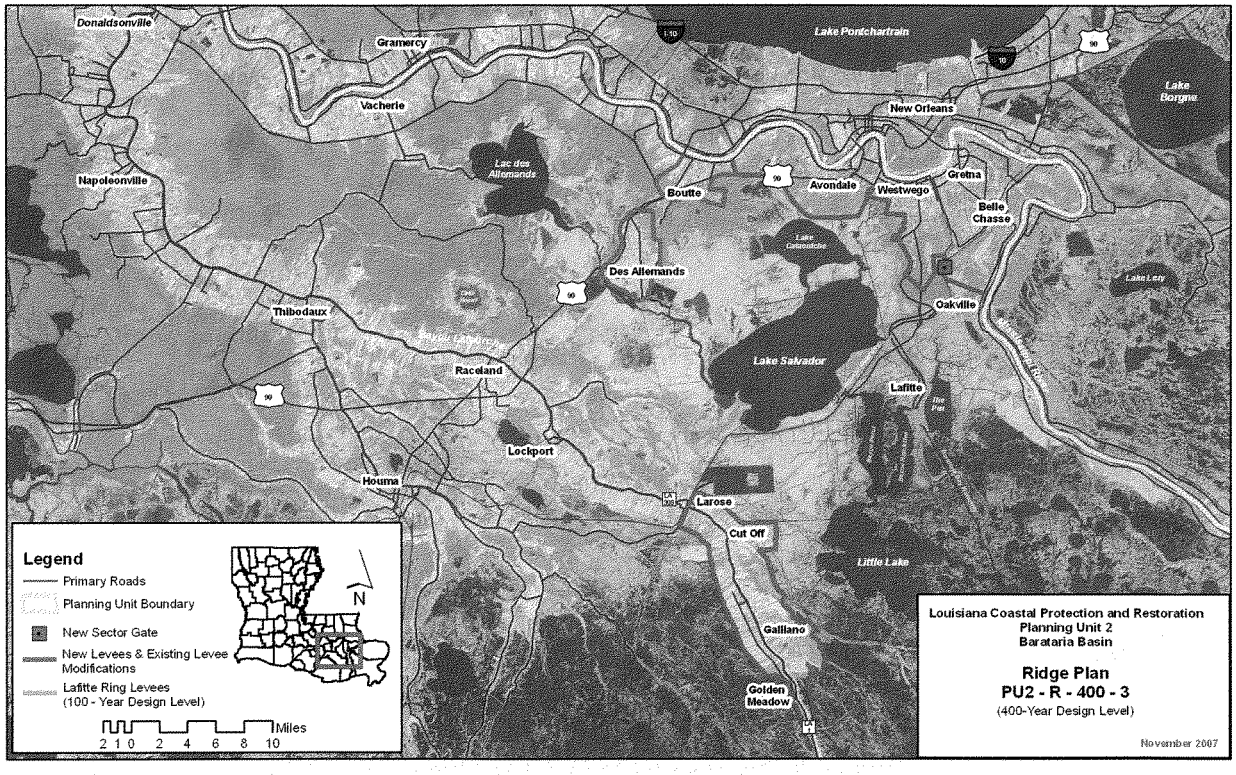
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Lake Pontchartrain
Lake Borgne
Vacherie
New Orleans
Napoleonville
Lac des Allemands
Boutte
Avondale
Westwego
Gretna
Belle Chasse
Des Allemands
Oakville
Thibodaux
Lake Salvador
Raceland
Lafitte
Lockport
Houma
Larose
Cut Off
Little Lake
Galliano
Golden Meadow
Legend
Primary Roads
Planning Unit Boundary
New Sector Gate
New Levees & Existing Levee Modifications
Lafitte Ring Levees (100 - Year Design Level)
N
Miles
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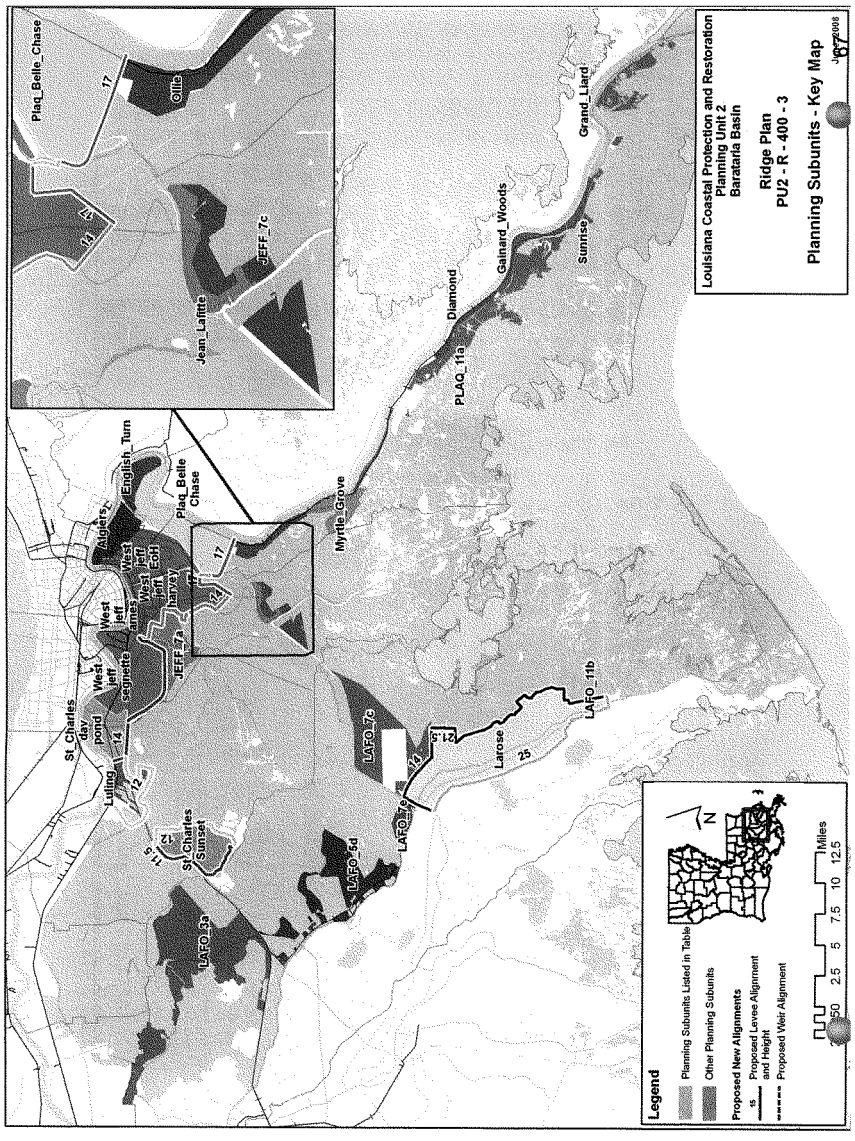
Louisiana Coastal Protection and Restoration
Planning Unit 2
Barataria Basin
Ridge Plan
PU2 - R - 400 - 3
(400-Year Design Level)
November 2007


Louisiana Coastal Protection and Restoration
Planning Unit 2
Barataria Basin
Ridge Plan
PU2 - R - 400 - 3
Planning Subunits - Key Map
Legend
Planning Subunits Listed in Table
Other Planning Subunits
Proposed New Alignments
Proposed Levee Alignment and Height
Proposed Weir Alignment
Miles
Plaq_Belle_Chase
Jean_Lafitte
JEFF_7c
Olile
Grand_Liard
Gainard_Woods
Sunrise
Diamond
PLAQ_11a
Myrtle_Grove
English_Turn
Algiers
Plaq_Belle Chase
West jeff EoH
West jeff harvey
West jeff ames
West jeff segnette
JEFF_7a
St_Charles day pond
Luling
St_Charles Sunset
LAFO_3a
LAFO_5d
LAFO_7e
LAFO_7c
Larose
LAFO_11b

Alternative: PU2-R-400-3

Water Surface Elevations (feet - NAVD88 2004.65)

Planning Sub Unit	2010 (Base) Conditions						2060 (Future) Conditions					
	100-yr Event		400-year Event		1,000-yr Event		100-yr Event		400-year Event		1,000-yr Event	
	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project
Algiers	-3.8	-3.9	10.7	-3.9	12.1	-3.9	12.9	-3.9	16.3	-3.9	17.9	-3.9
Diamond	13.0	13.0	16.7	16.7	18.9	18.9	16.2	16.2	26.3	19.9	30.2	22.1
English_Turn	-1.7	-1.7	10.7	-1.7	12.1	-1.7	12.9	-1.7	16.3	-1.7	17.9	-1.7
Gainard_Woods	13.5	13.5	17.3	17.3	19.7	19.7	16.7	16.7	20.5	20.5	22.9	22.9
Grand_Liard	15.0	15.0	16.7	16.7	18.9	18.9	18.2	18.2	26.3	19.9	30.2	22.1
Jean_Lafitte	8.4	8.4	11.9	11.9	14.0	14.0	13.0	11.6	16.9	15.1	19.3	17.2
JEFF_7a	7.7	7.7	10.8	10.8	13.1	13.1	12.8	10.9	17.1	14.0	18.2	16.3
JEFF_7c	8.4	8.4	11.9	11.9	14.0	14.0	22.7	11.6	27.6	15.1	30.0	17.2
LAFO_11b	11.6	11.6	14.5	14.5	16.1	16.1	14.4	14.8	16.9	17.7	18.4	19.3
LAFO_3a	3.9	3.9	5.1	5.1	6.0	6.0	7.0	7.1	8.2	8.3	9.0	9.2
LAFO_5d	5.8	5.8	8.7	8.7	10.9	10.9	10.6	9.0	13.4	11.9	15.1	14.1
LAFO_7c	7.1	7.1	9.1	9.1	10.3	10.3	12.0	10.3	14.2	12.3	15.4	13.5
LAFO_7e	8.1	8.1	11.3	11.3	13.4	13.4	12.5	11.3	15.3	14.5	17.3	16.6
Larose	-2.5	-2.9	9.0	-2.3	12.0	-0.5	15.0	-2.9	15.0	-2.3	15.0	-0.5
Luling	6.1	1.5	8.6	2.1	10.2	3.6	11.8	1.5	15.5	2.1	17.4	3.6
Myrtle_Grove	10.3	10.3	13.8	13.8	15.7	15.7	13.5	13.5	17.3	17.0	18.6	18.9
Ollie	8.0	8.0	13.2	13.2	15.3	15.3	11.2	11.2	19.2	16.4	22.1	18.5
PLAQ_11a	12.5	12.5	16.7	16.7	18.9	18.9	15.9	15.7	20.5	19.9	22.9	22.1
Plaq_Belle_Chase	-2.6	-2.8	11.0	-2.6	11.3	-1.8	11.6	-2.8	14.3	-2.6	15.8	-1.8
St_Charles_dav_pond	1.6	1.5	4.8	1.7	11.0	2.7	11.0	1.5	13.2	1.7	14.5	2.7
St_Charles_Sunset	7.0	-5.1	9.4	-4.8	10.7	-3.4	10.0	-5.1	12.3	-4.8	13.7	-3.4
Sunrise	15.0	15.0	16.7	16.7	18.9	18.9	18.2	18.2	26.3	19.9	30.2	22.1
West_jeff_ames	-1.5	-1.5	11.0	-0.3	11.3	5.0	11.6	-1.5	14.3	-0.3	15.8	5.0
West_jeff_EoH	-3.5	-3.7	11.0	-3.6	11.3	-3.4	11.6	-3.7	14.3	-3.6	15.8	-3.4
West_jeff_harvey	-2.4	-2.5	11.0	-2.2	11.3	1.8	11.6	-2.5	14.3	-2.2	15.8	1.8
West_jeff_segnette	-3.9	-4.0	11.0	-3.8	11.3	-1.0	11.6	-4.0	14.3	-3.8	15.8	-1.0
Evaluation Parameters	Confidence Level:			90%		Levee Design:			No Friction Waves			
	Future Relative Sea Level Rise:			3.2 feet		Levee Overtopping:			No Friction Waves			

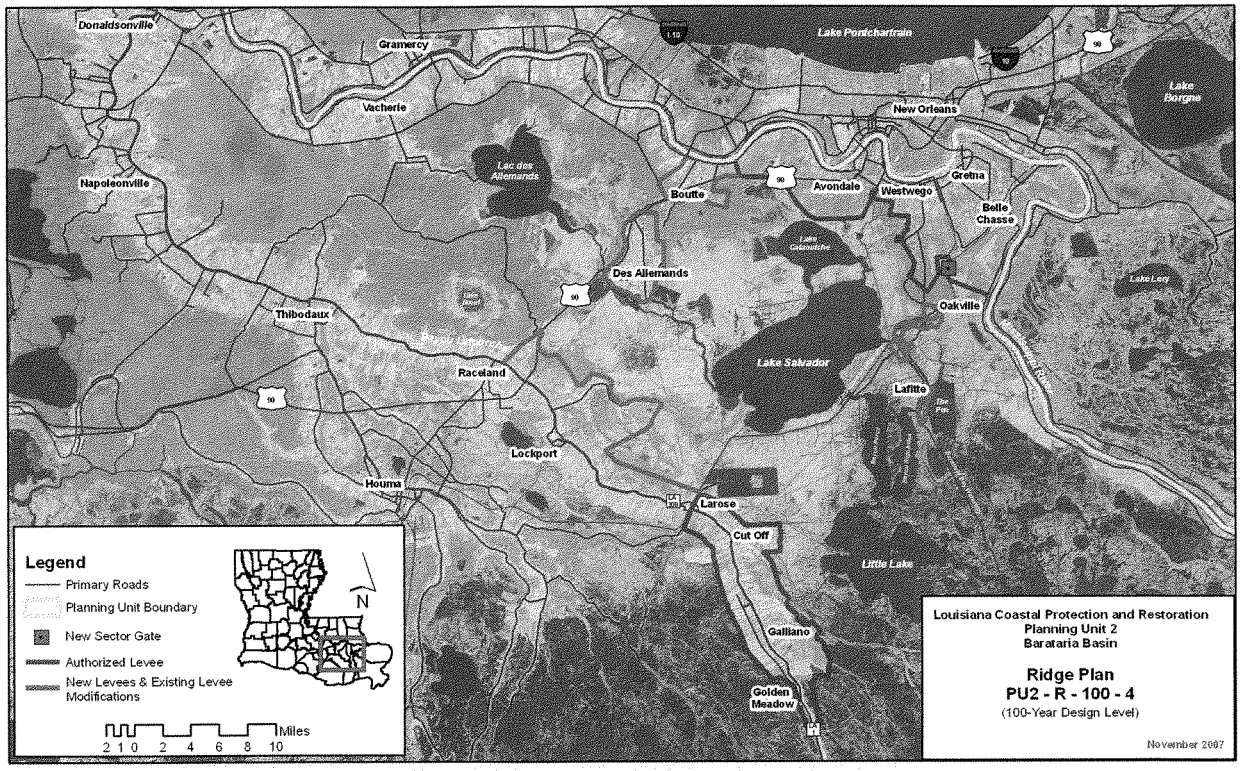
Planning Unit:	2	Alt. No.:	PU2-R-100-4	Category:	Coastal Restoration + Structural Measures
Alternative Description:	Sustain coastal landscape through restoration. Construct new sector gate on Bayou Barataria to reduce risk on the West Bank. Construct/raise Lafitte and Des Allemands ring levees to 100-year level of risk reduction and build new levees around Boutte and u				
Coastal Component:	R2 (pulsed diversions)			Nonstructural Component:	None
Structural Component:	See alternative description above.				

Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	1,481	13,571	334	560	1,202	85	277	17	8
		Mid		17,385	713	1,086	2,802	195	224	15	7
		Low		19,105	980	1,484	3,849	256	171	14	6
2	High RSLR High Employment Dispersed Population	High	1,486	14,251	454	761	1,772	138	277	15	7
		Mid		17,643	769	1,128	2,879	201	224	14	7
		Low		19,259	1,037	1,532	3,965	268	171	13	6
3	Low RSLR Business-as-Usual Compact Population	High	1,481	8,994	313	513	1,112	75	277	17	8
		Mid		12,444	658	881	2,430	157	224	15	7
		Low		14,071	898	1,219	3,316	205	171	14	6
4	High RSLR Business-as-Usual Compact Population	High	1,486	9,494	401	643	1,458	108	277	15	7
		Mid		12,581	692	913	2,485	162	224	14	7
		Low		14,136	925	1,251	3,358	210	171	13	6

Other Results			Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Construction Time (years)		11	After 50 yrs (% of baseline)	103	99	103	99
Direct Wetland Impacts (acres)		1,600	After 100 yrs (% of baseline)	110	104	110	104
Indirect Impacts (unitless)		4	Present Value of Life Cycle Costs ($ Millions)				
Spatial Integrity (unitless)		0.36	Coastal Component	15,657	15,689	15,657	15,689
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)	Nonstructural Component	0	0	0	0
	1 / 2	10,306	10,343	Structural Component	13,348	13,420	13,348	13,420
	3 / 4	10,306	10,343	Total Project	29,005	29,109	29,005	29,109

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 2
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	Structural Plan
10-year	1,583	956	2,834	1,833	1,512	859	2,129	1,084	Ridge Alt
100-year	46,652	4,136	49,467	5,361	37,218	2,978	39,133	3,578	
400-year	51,671	38,704	53,124	39,407	40,614	32,215	41,659	32,512	
1,000-year	53,208	42,529	54,188	43,131	41,777	34,811	42,556	35,047	100-year Design
2,000-year	53,965	43,620	54,716	44,107	42,386	35,478	42,963	35,676	

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price leve


Donaldsonville
Gramercy
Vacherie
Napoleonville
Lac des Allemands
Lake Pontchartrain
New Orleans
Lake Borgne
Boutte
Avondale
Westwego
Gretna
Belle Chasse
Des Allemands
Thibodaux
Raceland
Lake Salvador
Oakville
Lafitte
Lockport
Houma
Larose
Cut Off
Little Lake
Galliano
Golden Meadow
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Planning Unit Boundary
New Sector Gate
Authorized Levee
New Levees & Existing Levee Modifications
N
Miles
2 1 0 2 4 6 8 10
Louisiana Coastal Protection and Restoration
Planning Unit 2
Barataria Basin
Ridge Plan
PU2 - R - 100 - 4
(100-Year Design Level)
November 2007

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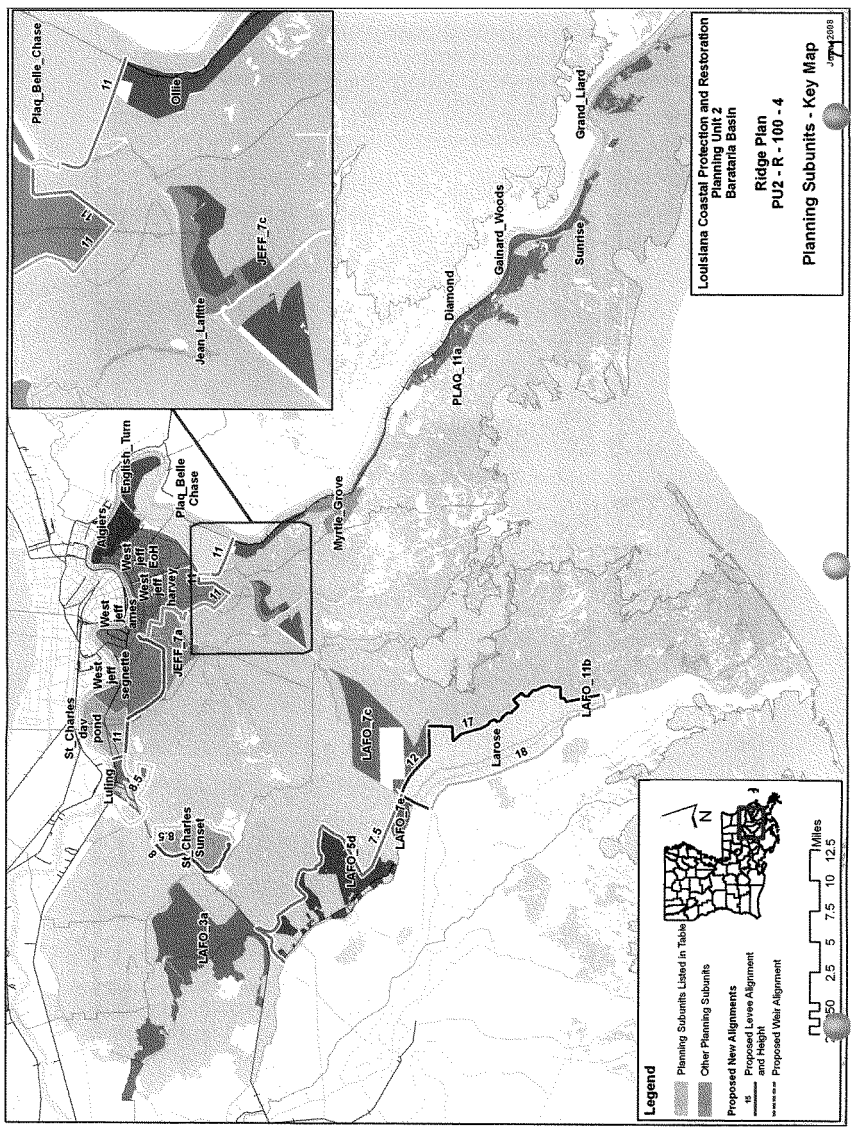
Louisiana Coastal Protection and Restoration
Planning Unit 2
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Ollie
Jean_Lafitte
JEFF_7c
Grand_Liard
Gainard_Woods
Sunrise
Diamond
PLAQ_11a
Myrtle_Grove
English_Turn
Plaq_Belle Chase
Algiers
West jeff EoH
West jeff harvey
West jeff ames
West jeff segnette
JEFF_7a
St_Charles day pond
Luling
St Charles Sunset
LAFO_3a
LAFO_5d
LAFO_7e
LAFO_7c
Larose
LAFO_11b

Alternative: PU2-R-100-4

Water Surface Elevations (feet - NAVD88 2004.65)

Planning Sub Unit	2010 (Base) Conditions						2060 (Future) Conditions					
	100-yr Event		400-year Event		1,000-yr Event		100-yr Event		400-year Event		1,000-yr Event	
	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project
Algiers	-3.8	-3.9	10.7	-3.9	12.1	-3.9	12.9	-3.9	16.3	-3.9	17.9	-3.9
Diamond	13.0	13.0	16.7	16.7	18.9	18.9	16.2	16.2	26.3	19.9	30.2	22.1
English_Turn	-1.7	-1.7	10.7	-1.7	12.1	-1.7	12.9	-1.7	16.3	-1.7	17.9	-1.7
Gainard_Woods	13.5	13.5	17.3	17.3	19.7	19.7	16.7	16.7	20.5	20.5	22.9	22.9
Grand_Liard	15.0	15.0	16.7	16.7	18.9	18.9	18.2	18.2	26.3	19.9	30.2	22.1
Jean_Lafitte	8.4	8.4	11.9	11.9	14.0	14.0	13.0	11.6	16.9	15.1	19.3	17.2
JEFF_7a	7.7	7.7	10.8	10.8	13.1	13.1	12.8	10.9	17.1	14.0	18.2	16.3
JEFF_7c	8.4	8.4	11.9	11.9	14.0	14.0	22.7	11.6	27.6	15.1	30.0	17.2
LAFO_11b	11.6	11.6	14.5	14.5	16.1	16.1	14.4	14.8	16.9	17.7	18.4	19.3
LAFO_3a	3.9	3.9	5.1	5.1	6.0	6.0	7.0	7.1	8.2	8.3	9.0	9.2
LAFO_5d	5.8	1.5	8.7	8.5	10.9	8.5	10.6	1.5	13.4	8.5	15.1	8.5
LAFO_7c	7.1	7.1	9.1	9.1	10.3	10.3	12.0	10.3	14.2	12.3	15.4	13.5
LAFO_7e	8.1	1.5	11.3	8.5	13.4	8.5	12.5	1.5	15.3	8.5	17.3	8.5
Larose	-2.5	-2.5	9.0	9.0	12.0	12.0	15.0	-2.5	15.0	9.0	15.0	12.0
Luling	6.1	2.2	8.6	8.1	10.2	8.5	11.8	2.2	15.5	8.1	17.4	8.5
Myrtle_Grove	10.3	10.3	13.8	13.8	15.7	15.7	13.5	13.5	17.3	17.0	18.6	18.9
Ollie	8.0	8.0	13.2	13.2	15.3	15.3	11.2	11.2	19.2	16.4	22.1	18.5
PLAQ_11a	12.5	12.5	16.7	16.7	18.9	18.9	15.9	15.7	20.5	19.9	22.9	22.1
Plaq_Belle_Chase	-2.6	-2.7	11.0	5.1	11.3	11.3	11.6	-2.7	14.3	5.1	15.8	11.3
St_Charles_dav_pond	1.6	1.6	4.8	4.8	11.0	11.0	11.0	1.6	13.2	4.8	14.5	11.0
St_Charles_Sunset	7.0	-4.7	9.4	5.7	10.7	8.5	10.0	-4.7	12.3	5.7	13.7	8.5
Sunrise	15.0	15.0	16.7	16.7	18.9	18.9	18.2	18.2	26.3	19.9	30.2	22.1
West_jeff_ames	-1.5	-1.5	11.0	11.0	11.3	11.3	11.6	-1.5	14.3	11.0	15.8	11.3
West_jeff_EoH	-3.5	-3.6	11.0	11.0	11.3	11.3	11.6	-3.6	14.3	11.0	15.8	11.3
West_jeff_harvey	-2.4	-2.4	11.0	11.0	11.3	11.3	11.6	-2.4	14.3	11.0	15.8	11.3
West_jeff_segnette	-3.9	-3.9	11.0	11.0	11.3	11.3	11.6	-3.9	14.3	11.0	15.8	11.3
Evaluation Parameters	Confidence Level:			90%		Levee Design:			No Friction Waves			
	Future Relative Sea Level Rise:			3.2 feet		Levee Overtopping:			No Friction Waves			

Planning Unit:	2	Alt. No.:	PU2-R-400-4	Category:	Coastal Restoration + Structural Measures
Alternative Description:	Sustain coastal landscape through restoration. Construct new sector gate on Bayou Barataria to reduce risk on the West Bank. Extend West Bank and Vicinity levees to Boutte; extend levees from Larose up Bayou Lafourche to Highway 90; and raise Des Allemand				
Coastal Component:	R2 (pulsed diversions)			Nonstructural Component:	None
Structural Component:	See alternative description above.				

Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	2,406	13,863	349	594	1,278	93	277	26	9
		Mid		17,220	712	1,122	2,823	202	224	26	9
		Low		18,233	879	1,360	3,366	230	171	25	8
2	High RSLR High Employment Dispersed Population	High	2,415	14,687	492	836	1,966	156	277	26	9
		Mid		17,499	774	1,168	2,906	209	224	25	9
		Low		18,389	938	1,413	3,486	243	171	23	8
3	Low RSLR Business-as-Usual Compact Population	High	2,406	9,240	325	542	1,170	81	277	26	9
		Mid		12,216	651	908	2,408	161	224	26	9
		Low		13,189	794	1,105	2,846	182	171	25	8
4	High RSLR Business-as-Usual Compact Population	High	2,415	9,850	432	704	1,602	122	277	26	9
		Mid		12,366	689	946	2,471	167	224	25	9
		Low		13,256	823	1,144	2,895	187	171	23	8

Other Results			Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Construction Time (years)		13	After 50 yrs (% of baseline)	103	99	103	99
Direct Wetland Impacts (acres)		5,300	After 100 yrs (% of baseline)	110	104	110	104
Indirect Impacts (unitless)		4	Present Value of Life Cycle Costs ($ Millions)				
Spatial Integrity (unitless)		0.36	Coastal Component	15,657	15,689	15,657	15,689
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)	Nonstructural Component	0	0	0	0
	1 / 2	17,039	Structural Component	31,466	31,605	31,466	31,605
	3 / 4	17,039	Total Project	47,123	47,294	47,123	47,294

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 2
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		Structural Plan
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	Ridge Alt
10-year	1,583	956	2,834	1,833	1,512	859	2,129	1,084	400-year Design
100-year	46,652	4,126	49,467	5,351	37,218	2,968	39,133	3,568	
400-year	51,671	6,628	53,124	7,331	40,614	3,895	41,659	4,192	
1,000-year	53,208	11,468	54,188	12,071	41,777	7,932	42,556	8,168	
2,000-year	53,965	30,382	54,716	30,868	42,386	24,894	42,963	25,093	

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price leve

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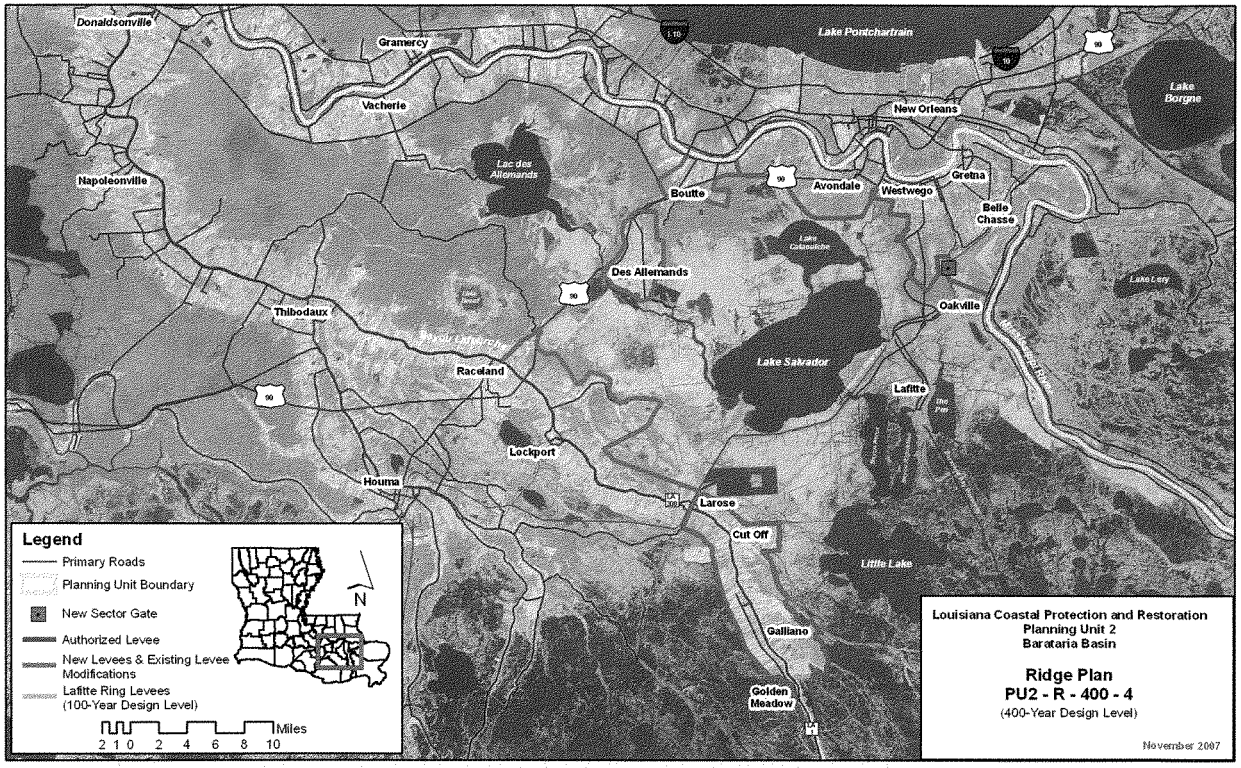
Donaldsonville
Gramercy
Vacherie
Napoleonville
Lake Pontchartrain
Lake Borgne
New Orleans
Lac des Allemands
Boutte
Avondale
Westwego
Gretna
Belle Chasse
Des Allemands
Thibodaux
Bayou Lafourche
Raceland
Oakville
Lake Salvador
Lafitte
Lockport
Houma
Larose
Cut Off
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Galliano
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Planning Unit Boundary
New Sector Gate
Authorized Levee
New Levees & Existing Levee Modifications
Lafitte Ring Levees (100-Year Design Level)
N
Miles
2 1 0 2 4 6 8 10
Louisiana Coastal Protection and Restoration
Planning Unit 2
Barataria Basin
Ridge Plan
PU2 - R - 400 - 4
(400-Year Design Level)
November 2007

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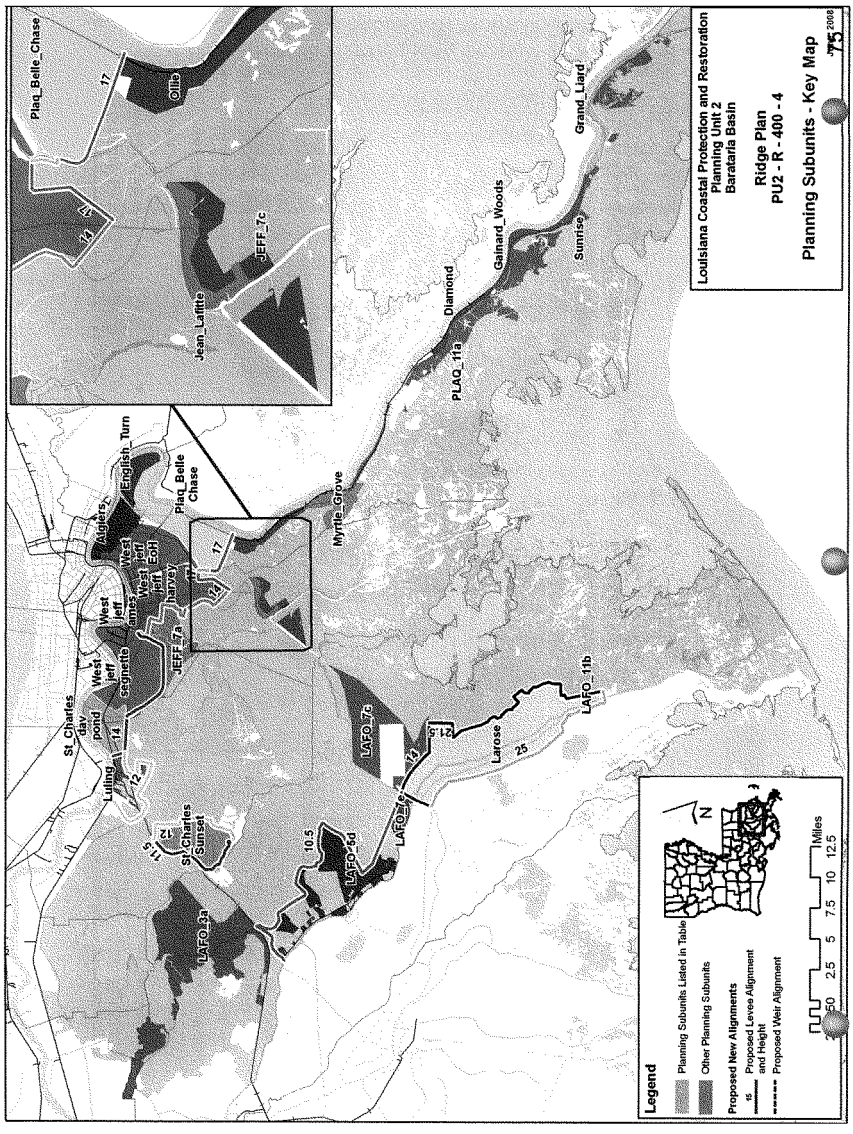
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Planning Subunits - Key Map
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Planning Subunits Listed in Table
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Proposed Levee Alignment and Height
Proposed Weir Alignment
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Plaq_Belle_Chase
Jean_Lafitte
JEFF_7c
Olle
Grand_Liard
Gainard_Woods
Sunrise
Diamond
PLAQ_11a
Myrtle_Grove
English_Turn
Plaq_Belle Chase
Algiers
West jeff EoH
West jeff harvey
West jeff ames
West jeff segnette
JEFF_7a
St_Charles day pond
Luling
St_Charles Sunset
LAFO_3a
LAFO_5d
LAFO_7e
LAFO_7c
Larose
LAFO_11b

Alternative: PU2-R-400-4

Water Surface Elevations (feet - NAVD88 2004.65)

Planning Sub Unit	2010 (Base) Conditions						2060 (Future) Conditions					
	100-yr Event		400-year Event		1,000-yr Event		100-yr Event		400-year Event		1,000-yr Event	
	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project
Algiers	-3.8	-3.9	10.7	-3.9	12.1	-3.9	12.9	-3.9	16.3	-3.9	17.9	-3.9
Diamond	13.0	13.0	16.7	16.7	18.9	18.9	16.2	16.2	26.3	19.9	30.2	22.1
English_Turn	-1.7	-1.7	10.7	-1.7	12.1	-1.7	12.9	-1.7	16.3	-1.7	17.9	-1.7
Gainard_Woods	13.5	13.5	17.3	17.3	19.7	19.7	16.7	16.7	20.5	20.5	22.9	22.9
Grand_Liard	15.0	15.0	16.7	16.7	18.9	18.9	18.2	18.2	26.3	19.9	30.2	22.1
Jean_Lafitte	8.4	8.4	11.9	11.9	14.0	14.0	13.0	11.6	16.9	15.1	19.3	17.2
JEFF_7a	7.7	7.7	10.8	10.8	13.1	13.1	12.8	10.9	17.1	14.0	18.2	16.3
JEFF_7c	8.4	8.4	11.9	11.9	14.0	14.0	22.7	11.6	27.6	15.1	30.0	17.2
LAFO_11b	11.6	11.6	14.5	14.5	16.1	16.1	14.4	14.8	16.9	17.7	18.4	19.3
LAFO_3a	3.9	3.9	5.1	5.1	6.0	6.0	7.0	7.1	8.2	8.3	9.0	9.2
LAFO_5d	5.8	1.1	8.7	1.4	10.9	2.7	10.6	1.1	13.4	1.4	15.1	2.7
LAFO_7c	7.1	7.1	9.1	9.1	10.3	10.3	12.0	10.3	14.2	12.3	15.4	13.5
LAFO_7e	8.1	1.1	11.3	1.4	13.4	2.7	12.5	1.1	15.3	1.4	17.3	2.7
Larose	-2.5	-2.9	9.0	-2.3	12.0	-0.5	15.0	-2.9	15.0	-2.3	15.0	-0.5
Luling	6.1	1.5	8.6	2.1	10.2	3.6	11.8	1.5	15.5	2.1	17.4	3.6
Myrtle_Grove	10.3	10.3	13.8	13.8	15.7	15.7	13.5	13.5	17.3	17.0	18.6	18.9
Ollie	8.0	8.0	13.2	13.2	15.3	15.3	11.2	11.2	19.2	16.4	22.1	18.5
PLAQ_11a	12.5	12.5	16.7	16.7	18.9	18.9	15.9	15.7	20.5	19.9	22.9	22.1
Plaq_Belle_Chase	-2.6	-2.8	11.0	-2.6	11.3	-1.8	11.6	-2.8	14.3	-2.6	15.8	-1.8
St_Charles_dav_pond	1.6	1.5	4.8	1.7	11.0	2.7	11.0	1.5	13.2	1.7	14.5	2.7
St_Charles_Sunset	7.0	-5.1	9.4	-4.8	10.7	-3.4	10.0	-5.1	12.3	-4.8	13.7	-3.4
Sunrise	15.0	15.0	16.7	16.7	18.9	18.9	18.2	18.2	26.3	19.9	30.2	22.1
West_jeff_ames	-1.5	-1.5	11.0	-0.3	11.3	5.0	11.6	-1.5	14.3	-0.3	15.8	5.0
West_jeff_EoH	-3.5	-3.7	11.0	-3.6	11.3	-3.4	11.6	-3.7	14.3	-3.6	15.8	-3.4
West_jeff_harvey	-2.4	-2.5	11.0	-2.2	11.3	1.8	11.6	-2.5	14.3	-2.2	15.8	1.8
West_jeff_segnette	-3.9	-4.0	11.0	-3.8	11.3	-1.0	11.6	-4.0	14.3	-3.8	15.8	-1.0

Evaluation Parameters				
	Confidence Level:	90%	Levee Design:	No Friction Waves
	Future Relative Sea Level Rise:	3.2 feet	Levee Overtopping:	No Friction Waves

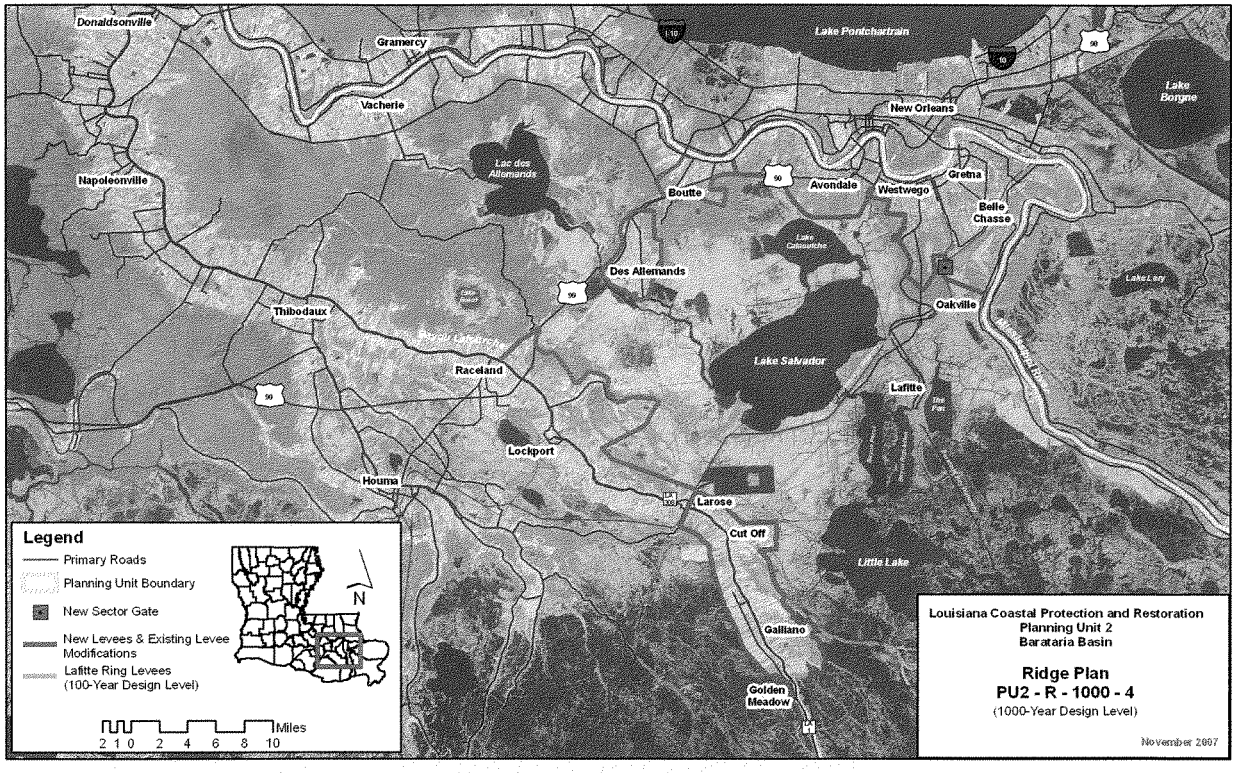
Planning Unit:	2	Alt. No.:	PU2-R-1000-4	Category:	Coastal Restoration + Structural Measures
Alternative Description:	Sustain coastal landscape through restoration. Construct new sector gate on Bayou Barataria to reduce risk on the West Bank. Extend West Bank and Vicinity levees to Boutte; extend levees from Larose up Bayou Lafourche to Highway 90; and raise Des Allemand				
Coastal Component:	R2 (pulsed diversions)			Nonstructural Component:	None
Structural Component:	See alternative description above.				

Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	2,800	13,863	349	594	1,278	93	277	26	9
		Mid		17,199	711	1,121	2,821	202	224	26	9
		Low		18,067	870	1,351	3,331	228	171	25	8
2	High RSLR High Employment Dispersed Population	High	2,832	14,687	492	836	1,966	156	277	26	9
		Mid		17,478	773	1,168	2,905	209	224	26	9
		Low		18,223	929	1,404	3,451	241	171	23	8
3	Low RSLR Business-as-Usual Compact Population	High	2,800	9,240	325	542	1,170	81	277	26	9
		Mid		12,195	650	907	2,406	161	224	26	9
		Low		13,029	786	1,097	2,811	180	171	25	8
4	High RSLR Business-as-Usual Compact Population	High	2,832	9,850	432	704	1,602	122	277	26	9
		Mid		12,346	689	946	2,469	167	224	26	9
		Low		13,096	814	1,136	2,860	185	171	23	8

Other Results				Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Construction Time (years)			13	After 50 yrs (% of baseline)	103	99	103	99
Direct Wetland Impacts (acres)			6,800	After 100 yrs (% of baseline)	110	104	110	104
Indirect Impacts (unitless)			4	Present Value of Life Cycle Costs ($ Millions)				
Spatial Integrity (unitless)			0.36	Coastal Component	15,657	15,689	15,657	15,689
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)		Nonstructural Component	0	0	0	0
	1 / 2	19,773	19,994	Structural Component	39,174	39,774	39,174	39,774
	3 / 4	19,773	19,994	Total Project	54,831	55,462	54,831	55,462

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 2
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		Structural Plan
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	Ridge Alt
10-year	1,583	956	2,834	1,833	1,512	859	2,129	1,084	1000-year Design
100-year	46,652	4,126	49,467	5,351	37,218	2,968	39,133	3,568	
400-year	51,671	6,541	53,124	7,244	40,614	3,820	41,659	4,117	
1,000-year	53,208	7,328	54,188	7,930	41,777	4,159	42,556	4,395	
2,000-year	53,965	8,995	54,716	9,482	42,386	5,448	42,963	5,647	

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price leve


Donaldsonville
Gramercy
Vacherie
Napoleonville
Lac des Allemands
Boutte
Lake Pontchartrain
New Orleans
Lake Borgne
Avondale
Westwego
Gretna
Belle Chasse
Lake Cataouatche
Des Allemands
Lake Leoy
Oakville
Thibodaux
Bayou Lafourche
Raceland
Lake Salvador
Lafitte
Lockport
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2 1 0 2 4 6 8 10
Louisiana Coastal Protection and Restoration
Planning Unit 2
Barataria Basin
Ridge Plan
PU2 - R - 1000 - 4
(1000-Year Design Level)
November 2007

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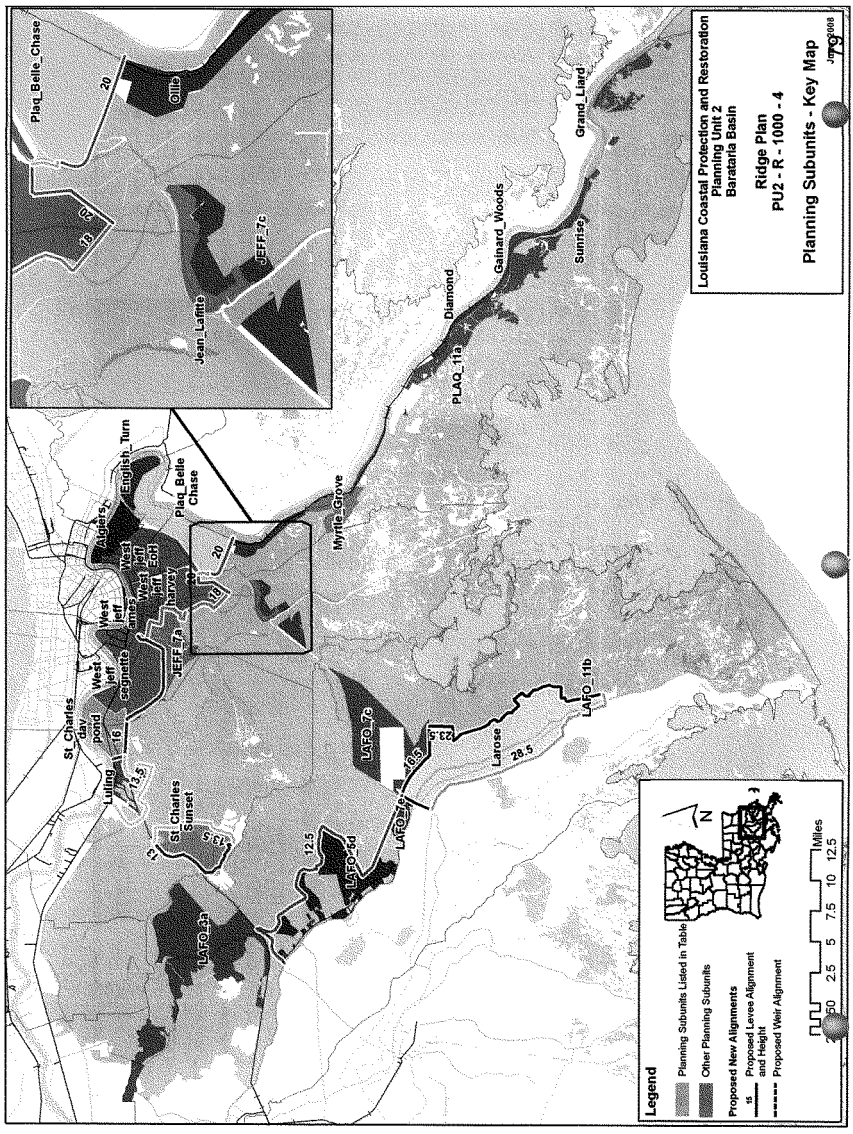
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JEFF_7c
Olile
Grand_Liard
Gainard_Woods
Sunrise
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PLAQ_11a
Myrtle_Grove
English_Turn
Algiers
Plaq_Belle Chase
West jeff EoH
West jeff harvey
West jeff ames
West jeff segnette
JEFF_7a
St_Charles day pond
Luling
St_Charles Sunset
LAFO_3a
LAFO_5d
LAFO_7e
LAFO_7c
Larose
LAFO_11b

Alternative: PU2-R-1000-4

Water Surface Elevations (feet - NAVD88 2004.65)

Planning Sub Unit	2010 (Base) Conditions						2060 (Future) Conditions					
	100-yr Event		400-year Event		1,000-yr Event		100-yr Event		400-year Event		1,000-yr Event	
	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project
Algiers	-3.8	-3.9	10.7	-3.9	12.1	-3.9	12.9	-3.9	16.3	-3.9	17.9	-3.9
Diamond	13.0	13.0	16.7	16.7	18.9	18.9	16.2	16.2	26.3	19.9	30.2	22.1
English_Turn	-1.7	-1.7	10.7	-1.7	12.1	-1.7	12.9	-1.7	16.3	-1.7	17.9	-1.7
Gainard_Woods	13.5	13.5	17.3	17.3	19.7	19.7	16.7	16.7	20.5	20.5	22.9	22.9
Grand_Liard	15.0	15.0	16.7	16.7	18.9	18.9	18.2	18.2	26.3	19.9	30.2	22.1
Jean_Lafitte	8.4	8.4	11.9	11.9	14.0	14.0	13.0	11.6	16.9	15.1	19.3	17.2
JEFF_7a	7.7	7.7	10.8	10.8	13.1	13.1	12.8	10.9	17.1	14.0	18.2	16.3
JEFF_7c	8.4	8.4	11.9	11.9	14.0	14.0	22.7	11.6	27.6	15.1	30.0	17.2
LAFO_11b	11.6	11.6	14.5	14.5	16.1	16.1	14.4	14.8	16.9	17.7	18.4	19.3
LAFO_3a	3.9	3.9	5.1	5.1	6.0	6.0	7.0	7.1	8.2	8.3	9.0	9.2
LAFO_5d	5.8	1.1	8.7	1.1	10.9	1.5	10.6	1.1	13.4	1.1	15.1	1.5
LAFO_7c	7.1	7.1	9.1	9.1	10.3	10.3	12.0	10.3	14.2	12.3	15.4	13.5
LAFO_7e	8.1	1.1	11.3	1.1	13.4	1.5	12.5	1.1	15.3	1.1	17.3	1.5
Larose	-2.5	-2.9	9.0	-2.8	12.0	-2.4	15.0	-2.9	15.0	-2.8	15.0	-2.4
Luling	6.1	1.5	8.6	1.6	10.2	2.2	11.8	1.5	15.5	1.6	17.4	2.2
Myrtle_Grove	10.3	10.3	13.8	13.8	15.7	15.7	13.5	13.5	17.3	17.0	18.6	18.9
Ollie	8.0	8.0	13.2	13.2	15.3	15.3	11.2	11.2	19.2	16.4	22.1	18.5
PLAQ_11a	12.5	12.5	16.7	16.7	18.9	18.9	15.9	15.7	20.5	19.9	22.9	22.1
Plaq_Belle_Chase	-2.6	-2.8	11.0	-2.7	11.3	-2.6	11.6	-2.8	14.3	-2.7	15.8	-2.6
St_Charles_dav_pond	1.6	1.5	4.8	1.6	11.0	1.7	11.0	1.5	13.2	1.6	14.5	1.7
St_Charles_Sunset	7.0	-5.1	9.4	-5.0	10.7	-4.7	10.0	-5.1	12.3	-5.0	13.7	-4.7
Sunrise	15.0	15.0	16.7	16.7	18.9	18.9	18.2	18.2	26.3	19.9	30.2	22.1
West_jeff_ames	-1.5	-1.5	11.0	-1.5	11.3	-0.5	11.6	-1.5	14.3	-1.5	15.8	-0.5
West_jeff_EoH	-3.5	-3.7	11.0	-3.7	11.3	-3.6	11.6	-3.7	14.3	-3.7	15.8	-3.6
West_jeff_harvey	-2.4	-2.5	11.0	-2.5	11.3	-2.2	11.6	-2.5	14.3	-2.5	15.8	-2.2
West_jeff_segnette	-3.9	-4.0	11.0	-4.0	11.3	-3.8	11.6	-4.0	14.3	-4.0	15.8	-3.8

Evaluation Parameters				
	Confidence Level:	90%	Levee Design:	No Friction Waves
	Future Relative Sea Level Rise:	3.2 feet	Levee Overtopping:	No Friction Waves

Planning Unit:	2	Alt. No.:	PU2-G-100-1	Category:	Coastal Restoration + Structural Measures
Alternative Description:	Sustain coastal landscape through restoration. Similar structural features as PU2-WBI-100-1 but with additional barrier-weir and levees along the GIWW to reduce risk to areas within the Barataria Basin. Also reduces risk to the Lafitte area.				
Coastal Component:	R2 (pulsed diversions)	Nonstructural Component:	None		
Structural Component:	See alternative description above.				

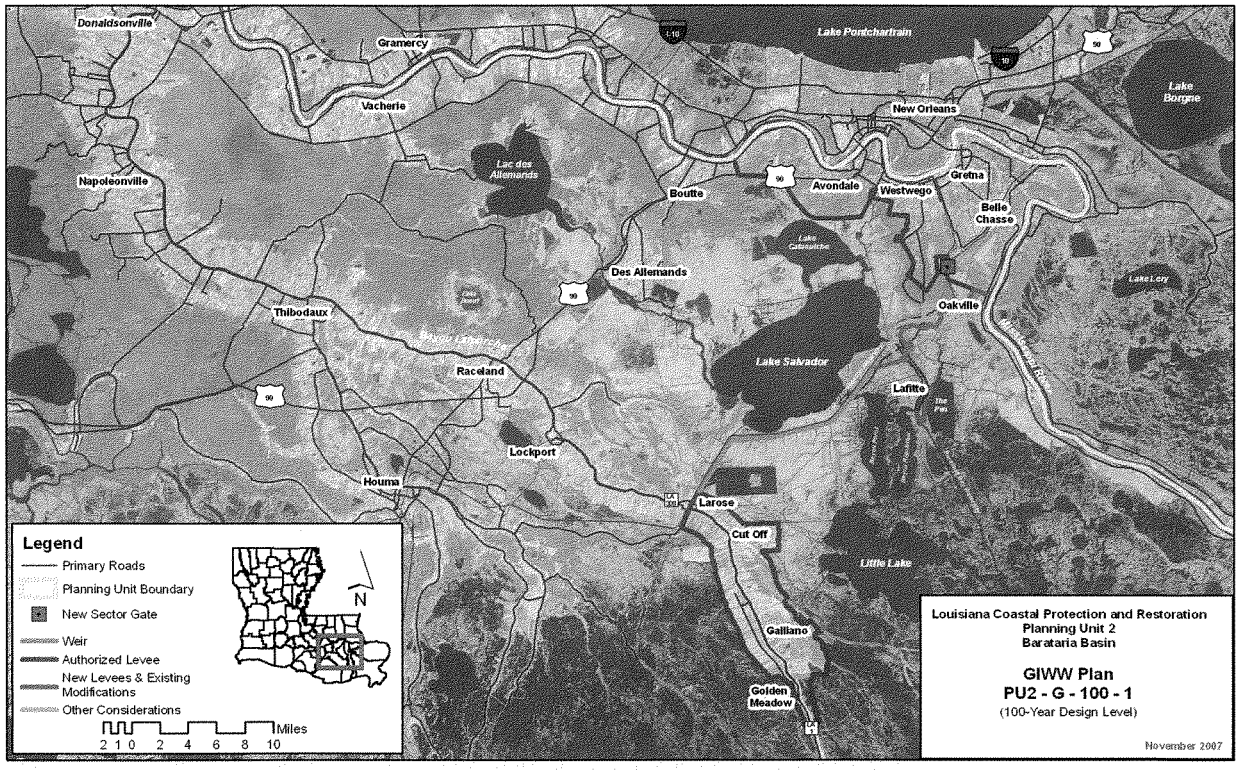
Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	1,188	15,688	352	639	1,347	94	502	26	9
		Mid		18,715	667	1,051	2,672	183	449	26	9
		Low		19,963	831	1,316	3,258	216	396	24	8
2	High RSLR High Employment Dispersed Population	High	1,197	16,567	481	900	1,973	150	502	26	9
		Mid		19,072	736	1,153	2,817	196	449	26	9
		Low		20,223	891	1,385	3,407	229	396	23	8
3	Low RSLR Business-as-Usual Compact Population	High	1,188	10,632	331	595	1,259	85	502	26	9
		Mid		13,423	628	908	2,375	154	449	26	9
		Low		14,604	773	1,099	2,852	178	396	24	8
4	High RSLR Business-as-Usual Compact Population	High	1,197	11,334	437	773	1,715	126	502	26	9
		Mid		13,711	676	1,014	2,543	169	449	26	9
		Low		14,798	814	1,228	3,042	197	396	23	8

Other Results			Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Construction Time (years)		11	After 50 yrs (% of baseline)	103	99	103	99
Direct Wetland Impacts (acres)		1,000	After 100 yrs (% of baseline)	110	104	110	104
Indirect Impacts (unitless)		-8	Present Value of Life Cycle Costs ($ Millions)				
Spatial Integrity (unitless)		0.36	Coastal Component	15,657	15,689	15,657	15,689
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)	Nonstructural Component	0	0	0	0
	1 / 2	8,287	Structural Component	7,604	7,748	7,604	7,748
	3 / 4	8,287	Total Project	23,261	23,437	23,261	23,437

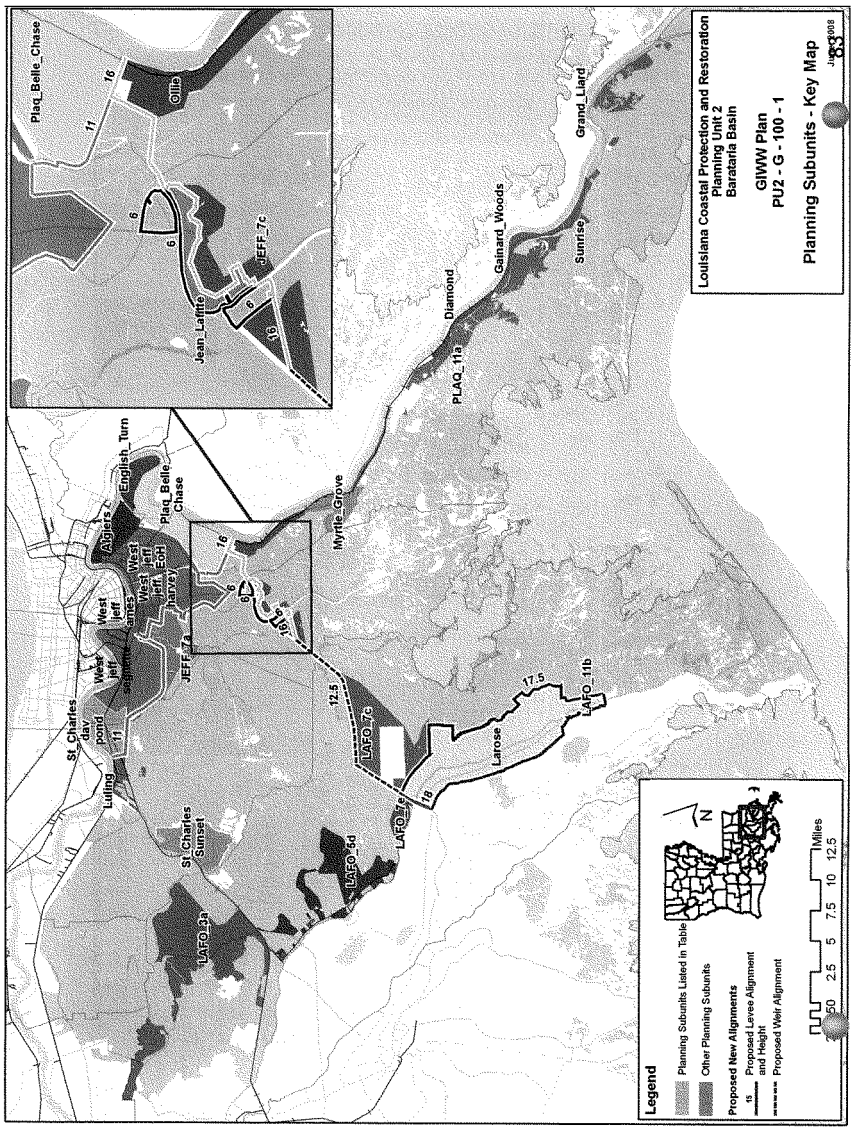
2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 2
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		Structural Plan
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	GIWW Alt
10-year	1,583	1,477	2,834	2,147	1,512	1,326	2,129	1,851	100-year Design
100-year	46,652	4,303	49,467	5,779	37,218	3,829	39,133	4,825	
400-year	51,671	8,510	53,124	10,065	40,614	6,603	41,659	7,467	
1,000-year	53,208	13,630	54,188	14,957	41,777	9,687	42,556	10,342	
2,000-year	53,965	15,564	54,716	16,482	42,386	10,712	42,963	11,370	

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels

1833


Donaldsonville
Gramercy
Lake Pontchartrain
Lake Borgne
Vacherie
New Orleans
Lac des Allemands
Napoleonville
Boutte
Avondale
Westwego
Gretna
Belle Chasse
Des Allemands
Thibodaux
Oakville
Lake Salvador
Raceland
Lafitte
Lockport
Houma
Larose
Cut Off
Little Lake
Galliano
Golden Meadow
Legend
Primary Roads
Planning Unit Boundary
New Sector Gate
Weir
Authorized Levee
New Levees & Existing Modifications
Other Considerations
N
Miles
2 1 0 2 4 6 8 10
Louisiana Coastal Protection and Restoration
Planning Unit 2
Barataria Basin
GIWW Plan
PU2 - G - 100 - 1
(100-Year Design Level)
November 2007

1834


Louisiana Coastal Protection and Restoration
Planning Unit 2
Barataria Basin
GIWW Plan
PU2 - G - 100 - 1
Planning Subunits - Key Map
Legend
Planning Subunits Listed in Table
Other Planning Subunits
Proposed New Alignments
Proposed Levee Alignment and Height
Proposed Weir Alignment
Miles
Plaq_Belle_Chase
Jean_Lafitte
JEFF_7c
Olile
Grand_Liard
Gainard_Woods
Sunrise
Diamond
PLAQ_11a
Myrtle_Grove
English_Turn
Algiers
Plaq_Belle_Chase
West jeff harvey
West jeff ames
West jeff segment
JEFF_7a
St_Charles day pond
Lulling
St_Charles Sunset
LAFO_3a
LAFO_5d
LAFO_7e
LAFO_7c
Larose
LAFO_11b

Alternative: PU2-G-100-1

Water Surface Elevations (feet - NAVD88 2004.65)

Planning Sub Unit	2010 (Base) Conditions						2060 (Future) Conditions					
	100-yr Event		400-year Event		1,000-yr Event		100-yr Event		400-year Event		1,000-yr Event	
	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project
Algiers	-3.8	-3.9	10.7	-3.9	12.1	-3.9	12.9	-3.9	16.3	-3.9	17.9	-3.9
Diamond	13.0	13.0	16.7	16.4	18.9	18.6	16.2	16.2	26.3	19.6	30.2	21.8
English_Turn	-1.7	-1.7	10.7	-1.7	12.1	-1.7	12.9	-1.7	16.3	-1.7	17.9	-1.7
Gainard_Woods	13.5	13.5	17.3	17.6	19.7	20.1	16.7	16.7	20.5	20.8	22.9	23.3
Grand_Liard	15.0	15.0	16.7	16.4	18.9	18.6	18.2	18.2	26.3	19.6	30.2	21.8
Jean_Lafitte	8.4	3.5	11.9	6.0	14.0	6.0	13.0	3.5	16.9	6.0	19.3	6.0
JEFF_7a	7.7	4.5	10.8	7.2	13.1	9.8	12.8	7.7	17.1	10.4	18.2	13.0
JEFF_7c	8.4	12.0	11.9	15.5	14.0	17.6	22.7	15.2	27.6	18.7	30.0	20.8
LAFO_11b	11.6	11.4	14.5	14.6	16.1	16.3	14.4	14.6	16.9	17.8	18.4	19.5
LAFO_3a	3.9	3.2	5.1	4.3	6.0	5.1	7.0	6.4	8.2	7.5	9.0	8.3
LAFO_5d	5.8	3.1	8.7	4.4	10.9	5.4	10.6	6.3	13.4	7.6	15.1	8.6
LAFO_7c	7.1	10.2	9.1	12.2	10.3	13.5	12.0	13.4	14.2	15.4	15.4	16.7
LAFO_7e	8.1	5.0	11.3	6.2	13.4	6.9	12.5	8.2	15.3	9.4	17.3	10.1
Larose	-2.5	-2.6	9.0	6.9	12.0	15.0	15.0	-2.6	15.0	6.9	15.0	15.0
Luling	6.1	4.3	8.6	5.9	10.2	7.0	11.8	7.5	15.5	9.1	17.4	10.2
Myrtle_Grove	10.3	9.4	13.8	11.7	15.7	12.8	13.5	12.6	17.3	14.9	18.6	16.0
Ollie	8.0	8.0	13.2	16.0	15.3	18.1	11.2	11.2	19.2	19.2	22.1	21.3
PLAQ_11a	12.5	12.5	16.7	16.4	18.9	18.6	15.9	15.7	20.5	19.6	22.9	21.8
Plaq_Belle_Chase	-2.6	-2.7	11.0	-0.8	11.3	2.9	11.6	-2.7	14.3	-0.8	15.8	2.9
St_Charles_dav_pond	1.6	1.5	4.8	1.5	11.0	1.6	11.0	1.5	13.2	1.5	14.5	1.6
St_Charles_Sunset	7.0	6.3	9.4	8.9	10.7	10.5	10.0	9.5	12.3	12.1	13.7	13.7
Sunrise	15.0	15.0	16.7	16.4	18.9	18.6	18.2	18.2	26.3	19.6	30.2	21.8
West_jeff_ames	-1.5	-1.5	11.0	-1.5	11.3	-1.3	11.6	-1.5	14.3	-1.5	15.8	-1.3
West_jeff_EoH	-3.5	-3.7	11.0	-3.7	11.3	-3.7	11.6	-3.7	14.3	-3.7	15.8	-3.7
West_jeff_harvey	-2.4	-2.5	11.0	-2.5	11.3	-2.5	11.6	-2.5	14.3	-2.5	15.8	-2.5
West_jeff_segnette	-3.9	-4.0	11.0	-4.0	11.3	-4.0	11.6	-4.0	14.3	-4.0	15.8	-4.0
Evaluation Parameters	Confidence Level:			90%		Levee Design:			No Friction Waves			
	Future Relative Sea Level Rise:			3.2 feet		Levee Overtopping:			No Friction Waves			

1836

Planning Unit:	2	Alt. No.:	PU2-G-100-4	Category:	Coastal Restoration + Structural Measures
Alternative Description:	Sustain coastal landscape through restoration. Similar structural features as PU2-R-100-4 but with additional barrier-weir and levees along the GIWW to reduce risk to areas within the Barataria Basin. Also reduces risk to the Lafitte area.				
Coastal Component:	R2 (pulsed diversions)		Nonstructural Component:		None
Structural Component:	See alternative description above.				

Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	1,541	13,610	319	593	1,206	86	502	26	9
		Mid		16,492	626	985	2,472	170	449	26	9
		Low		17,697	782	1,242	3,040	202	396	24	8
2	High RSLR High Employment Dispersed Population	High	1,552	14,375	433	825	1,753	135	502	26	9
		Mid		16,762	678	1,062	2,550	178	449	26	9
		Low		17,897	824	1,286	3,114	209	396	23	8
3	Low RSLR Business-as-Usual Compact Population	High	1,541	8,837	298	549	1,112	76	502	26	9
		Mid		11,481	587	847	2,185	142	449	26	9
		Low		12,569	725	1,026	2,641	165	396	24	8
4	High RSLR Business-as-Usual Compact Population	High	1,552	9,397	390	700	1,499	111	502	26	9
		Mid		11,649	620	896	2,261	149	449	26	9
		Low		12,693	750	1,067	2,704	171	396	23	8

Other Results		Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Construction Time (years)	11	After 50 yrs (% of baseline)	103	99	103	99
Direct Wetland Impacts (acres)	2,200	After 100 yrs (% of baseline)	110	104	110	104
Indirect Impacts (unitless)	-8	Present Value of Life Cycle Costs ($ Millions)				
Spatial Integrity (unitless)	0.36	Coastal Component	15,657	15,689	15,657	15,689
Non-Federal Share of Present Value of Life Cycle Costs	Scenario ($ Millions)	Nonstructural Component	0	0	0	0
	1 / 2 10,826 10,900	Structural Component	14,521	14,700	14,521	14,700
	3 / 4 10,826 10,900	Total Project	30,178	30,389	30,178	30,389

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)								
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4	
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj
10-year	1,583	959	2,834	1,352	1,512	800	2,129	1,061
100-year	46,652	3,227	49,467	4,105	37,218	2,832	39,133	3,291
400-year	51,671	7,521	53,124	8,395	40,614	5,852	41,659	6,164
1,000-year	53,208	12,199	54,188	13,026	41,777	8,630	42,556	8,866
2,000-year	53,965	13,855	54,716	14,329	42,386	9,449	42,963	9,655

Planning Unit 2

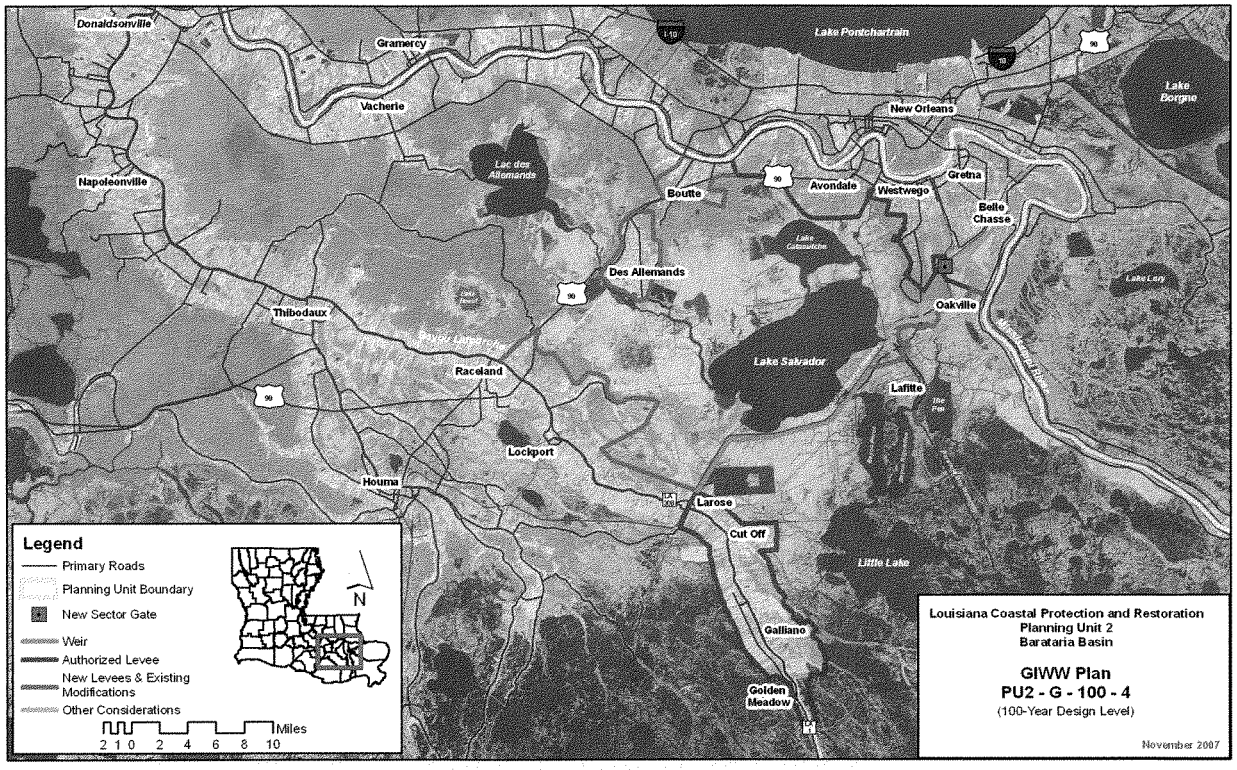
Structural Plan

GIWW Alt

100-year Design

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price level

1837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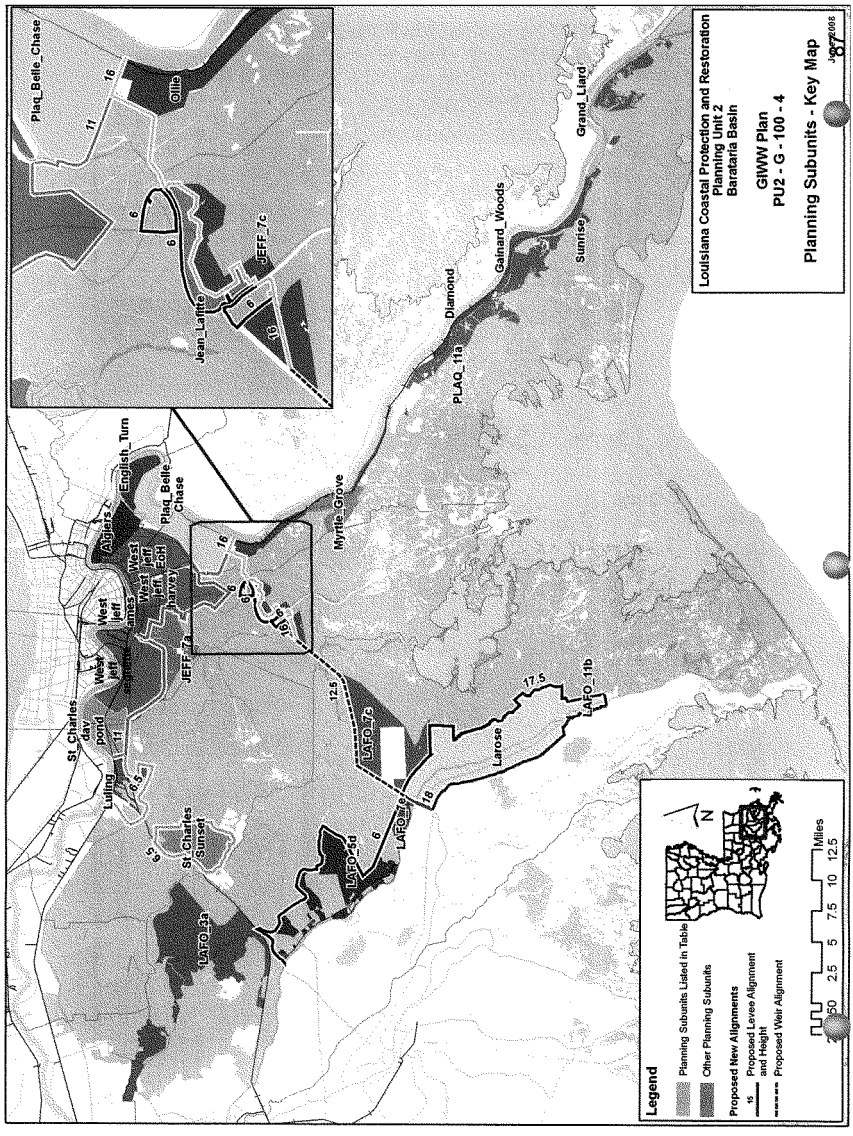
Lake Borgne
Vacherie
New Orleans
Lac des Allemands
Napoleonville
Boutte
Avondale
Westwego
Gretna
Belle Chasse
Des Allemands
Oakville
Thibodaux
Lake Salvador
Raceland
Lafitte
Lockport
Houma
Larose
Cut Off
Little Lake
Galliano
Golden Meadow
Legend
Primary Roads
Planning Unit Boundary
New Sector Gate
Weir
Authorized Levee
New Levees & Existing Modifications
Other Considerations
N
Miles
2 1 0 2 4 6 8 10
Louisiana Coastal Protection and Restoration
Planning Unit 2
Barataria Basin
GIWW Plan
PU2 - G - 100 - 4
(100-Year Design Level)
November 2007

1838


Louisiana Coastal Protection and Restoration
Planning Unit 2
Barataria Basin
GIWW Plan
PU2 - G - 100 - 4
Planning Subunits - Key Map
Legend
Planning Subunits Listed in Table
Other Planning Subunits
Proposed New Alignments
Proposed Levee Alignment and Height
Proposed Weir Alignment
Miles
Plaq_Belle_Chase
Oille
Jean_Lafitte
JEFF_7c
English_Turn
Algiers
Plaq_Belle_Chase
West jeff ames
West jeff harvey
West jeff EoH
West jeff segment
JEFF_7a
St_Charles day pond
Luling
St_Charles Sunset
LAFO_3a
LAFO_5d
LAFO_7e
LAFO_7c
Myrtle_Grove
Larose
LAFO_11b
PLAQ_11a
Diamond
Gainard_Woods
Sunrise
Grand_Liard

Alternative: PU2-G-100-4

Water Surface Elevations (feet - NAVD88 2004.65)

Planning Sub Unit	2010 (Base) Conditions						2060 (Future) Conditions					
	100-yr Event		400-year Event		1,000-yr Event		100-yr Event		400-year Event		1,000-yr Event	
	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project
Algiers	-3.8	-3.9	10.7	-3.9	12.1	-3.9	12.9	-3.9	16.3	-3.9	17.9	-3.9
Diamond	13.0	13.0	16.7	16.4	18.9	18.6	16.2	16.2	26.3	19.6	30.2	21.8
English_Turn	-1.7	-1.7	10.7	-1.7	12.1	-1.7	12.9	-1.7	16.3	-1.7	17.9	-1.7
Gainard_Woods	13.5	13.5	17.3	17.6	19.7	20.1	16.7	16.7	20.5	20.8	22.9	23.3
Grand_Liard	15.0	15.0	16.7	16.4	18.9	18.6	18.2	18.2	26.3	19.6	30.2	21.8
Jean_Lafitte	8.4	3.5	11.9	6.0	14.0	6.0	13.0	3.5	16.9	6.0	19.3	6.0
JEFF_7a	7.7	4.5	10.8	7.2	13.1	9.8	12.8	7.7	17.1	10.4	18.2	13.0
JEFF_7c	8.4	12.0	11.9	15.5	14.0	17.6	22.7	15.2	27.6	18.7	30.0	20.8
LAFO_11b	11.6	11.4	14.5	14.6	16.1	16.3	14.4	14.6	16.9	17.8	18.4	19.5
LAFO_3a	3.9	3.2	5.1	4.3	6.0	5.1	7.0	6.4	8.2	7.5	9.0	8.3
LAFO_5d	5.8	1.3	8.7	5.1	10.9	6.0	10.6	1.3	13.4	5.1	15.1	6.0
LAFO_7c	7.1	10.2	9.1	12.2	10.3	13.5	12.0	13.4	14.2	15.4	15.4	16.7
LAFO_7e	8.1	1.3	11.3	5.1	13.4	6.0	12.5	1.3	15.3	5.1	17.3	6.0
Larose	-2.5	-2.6	9.0	6.9	12.0	15.0	15.0	-2.6	15.0	6.9	15.0	15.0
Luling	6.1	2.0	8.6	6.5	10.2	6.5	11.8	2.0	15.5	6.5	17.4	6.5
Myrtle_Grove	10.3	9.4	13.8	11.7	15.7	12.8	13.5	12.6	17.3	14.9	18.6	16.0
Ollie	8.0	8.0	13.2	16.0	15.3	18.1	11.2	11.2	19.2	19.2	22.1	21.3
PLAQ_11a	12.5	12.5	16.7	16.4	18.9	18.6	15.9	15.7	20.5	19.6	22.9	21.8
Plaq_Belle_Chase	-2.6	-2.7	11.0	-0.8	11.3	2.9	11.6	-2.7	14.3	-0.8	15.8	2.9
St_Charles_dav_pond	1.6	1.5	4.8	1.5	11.0	1.6	11.0	1.5	13.2	1.5	14.5	1.6
St_Charles_Sunset	7.0	-4.8	9.4	5.1	10.7	6.5	10.0	-4.8	12.3	5.1	13.7	6.5
Sunrise	15.0	15.0	16.7	16.4	18.9	18.6	18.2	18.2	26.3	19.6	30.2	21.8
West_jeff_ames	-1.5	-1.5	11.0	-1.5	11.3	-1.3	11.6	-1.5	14.3	-1.5	15.8	-1.3
West_jeff_EoH	-3.5	-3.7	11.0	-3.7	11.3	-3.7	11.6	-3.7	14.3	-3.7	15.8	-3.7
West_jeff_harvey	-2.4	-2.5	11.0	-2.5	11.3	-2.5	11.6	-2.5	14.3	-2.5	15.8	-2.5
West_jeff_segnette	-3.9	-4.0	11.0	-4.0	11.3	-4.0	11.6	-4.0	14.3	-4.0	15.8	-4.0

Evaluation Parameters				
	Confidence Level:	90%	Levee Design:	No Friction Waves
	Future Relative Sea Level Rise:	3.2 feet	Levee Overtopping:	No Friction Waves

Planning Unit:	2	Alt. No.:	PU2-G-400-4	Category:	Coastal Restoration + Structural Measures
Alternative Description:	Sustain coastal landscape through restoration. Similar structural features as PU2-R-400-4 but with additional barrier-weir and levees along the GIWW to reduce risk to areas within the Barataria Basin. Also reduces risk to the Lafitte area.				
Coastal Component:	R2 (pulsed diversions)		Nonstructural Component:		None
Structural Component:	See alternative description above.				

Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	2,574	14,073	343	630	1,303	95	502	27	9
		Mid		17,142	688	1,094	2,760	195	449	27	9
		Low		18,067	839	1,327	3,262	221	396	25	8
2	High RSLR High Employment Dispersed Population	High	2,582	14,977	481	900	1,970	155	502	27	9
		Mid		17,432	746	1,173	2,844	203	449	27	9
		Low		18,265	884	1,377	3,344	230	396	24	8
3	Low RSLR Business-as-Usual Compact Population	High	2,574	9,277	318	580	1,193	83	502	27	9
		Mid		12,074	640	931	2,414	161	449	27	9
		Low		12,944	772	1,095	2,813	180	396	25	8
4	High RSLR Business-as-Usual Compact Population	High	2,582	9,942	430	761	1,663	127	502	27	9
		Mid		12,253	677	986	2,496	169	449	27	9
		Low		13,065	799	1,143	2,882	187	396	24	8

Other Results		
Construction Time (years)		13
Direct Wetland Impacts (acres)		7,400
Indirect Impacts (unitless)		-8
Spatial Integrity (unitless)		0.36
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)
	1 / 2	18,158 / 18,217
	3 / 4	18,158 / 18,217

Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
After 50 yrs (% of baseline)	103	99	103	99
After 100 yrs (% of baseline)	110	104	110	104
Present Value of Life Cycle Costs ($ Millions)				
Coastal Component	15,657	15,689	15,657	15,689
Nonstructural Component	0	0	0	0
Structural Component	34,745	34,880	34,745	34,880
Total Project	50,402	50,569	50,402	50,569

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)								
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4	
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj
10-year	1,583	959	2,834	1,352	1,512	800	2,129	1,061
100-year	46,652	3,208	49,467	4,085	37,218	2,813	39,133	3,271
400-year	51,671	5,118	53,124	5,992	40,614	3,506	41,659	3,818
1,000-year	53,208	6,641	54,188	7,469	41,777	4,015	42,556	4,251
2,000-year	53,965	7,692	54,716	8,166	42,386	4,570	42,963	4,777

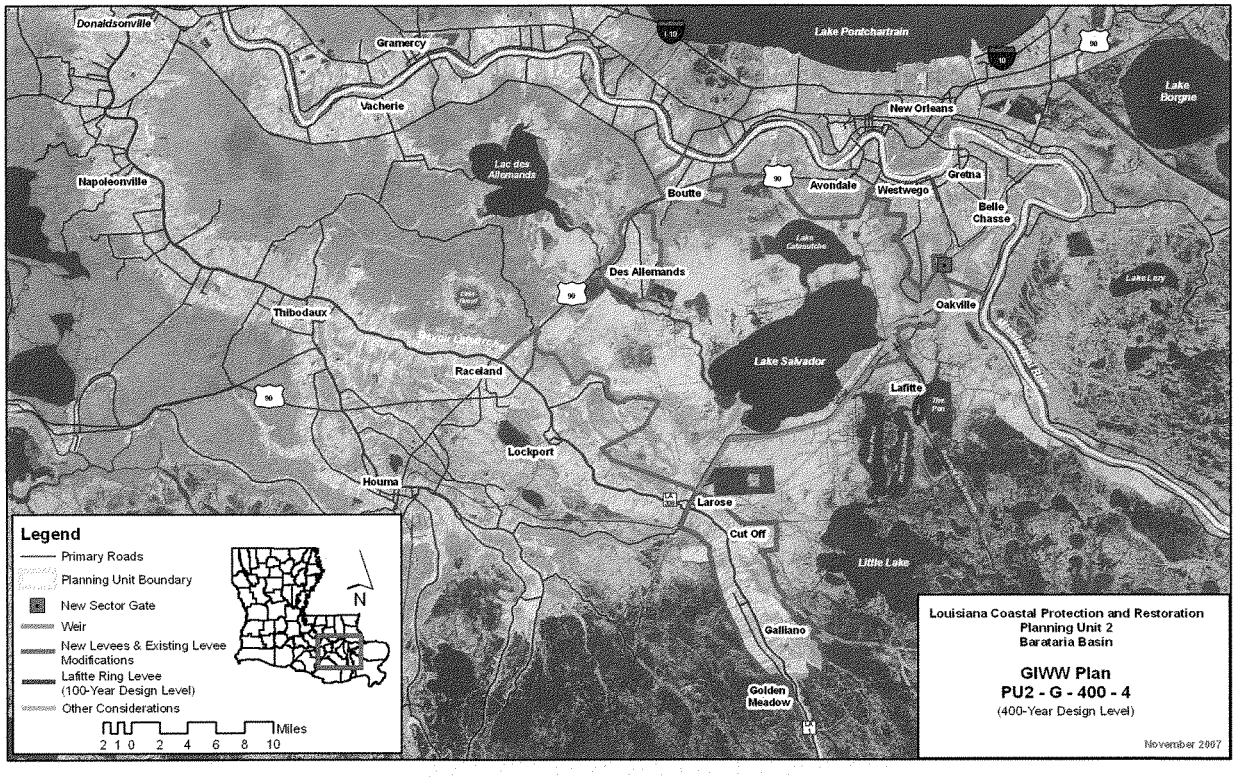
Planning Unit 2

Structural Plan

GIWW Alt

400-year Design

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price level


Donaldsonville
Gramercy
Lake Pontchartrain
Lake Borgne
Vacherie
New Orleans
Napoleonville
Lac des Allemands
Boutte
Avondale
Westwego
Gretna
Belle Chasse
Des Allemands
Lake Cataouatche
Lake Leroy
Thibodaux
Oakville
Bayou Lafourche
Raceland
Lake Salvador
Lafitte
Lockport
Houma
Larose
Cut Off
Little Lake
Galliano
Golden Meadow
Legend
Primary Roads
Planning Unit Boundary
New Sector Gate
Weir
New Levees & Existing Levee Modifications
Lafitte Ring Levee (100-Year Design Level)
Other Considerations
N
2 1 0 2 4 6 8 10 Miles
Louisiana Coastal Protection and Restoration
Planning Unit 2
Barataria Basin
GIWW Plan
PU2 - G - 400 - 4
(400-Year Design Level)
November 2007

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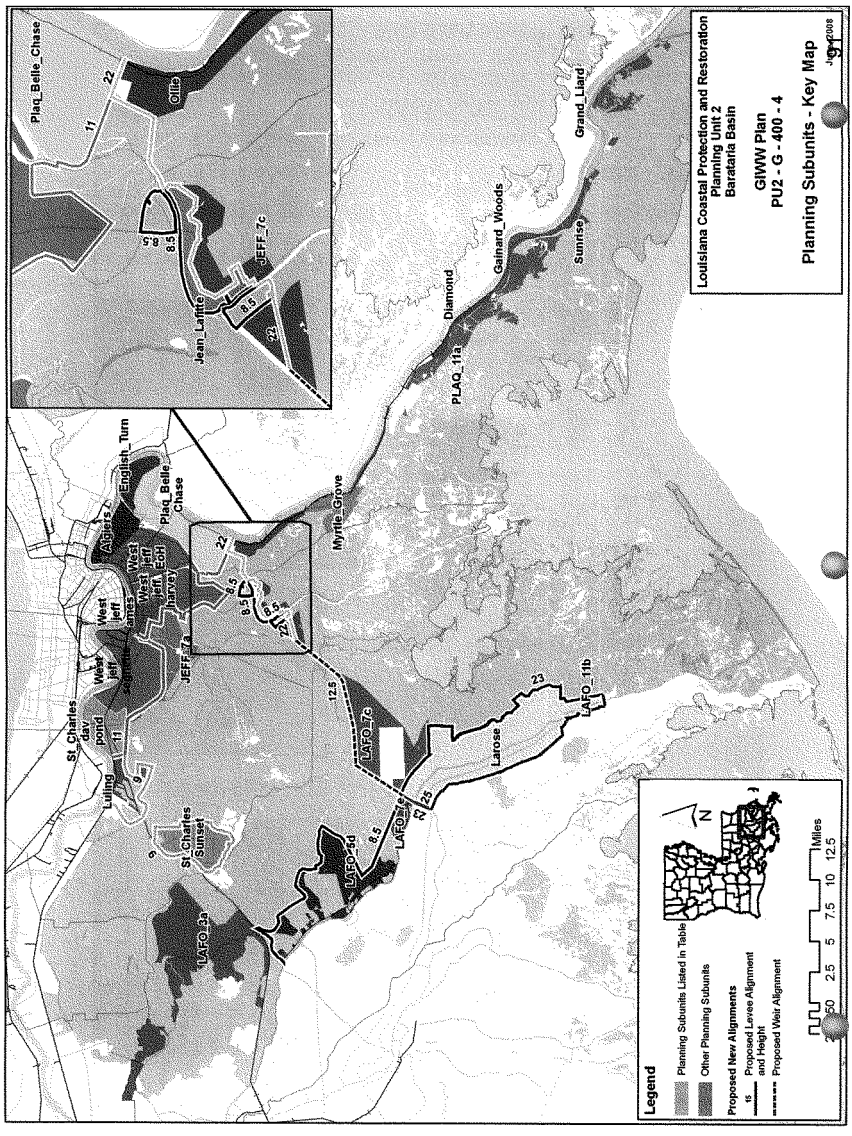
Louisiana Coastal Protection and Restoration
Planning Unit 2
Barataria Basin
GIWW Plan
PU2 - G - 400 - 4
Planning Subunits - Key Map
Legend
Planning Subunits Listed in Table
Other Planning Subunits
Proposed New Alignments
Proposed Levee Alignment and Height
Proposed Weir Alignment
Miles
Plaq_Belle_Chase
Cille
Jean_Lafitte
JEFF_7c
English_Turn
Algiers
Plaq_Belle_Chase
West jeff
West jeff
West jeff
EoH
harvey
West jeff
ames
West jeff
segnette
JEFF_7a
St_Charles day pond
Luling
St_Charles Sunset
LAFO_3a
LAFO_5d
LAFO_7e
LAFO_7c
Myrtle_Grove
Larose
LAFO_11b
PLAQ_11a
Diamond
Gainard_Woods
Sunrise
Grand_Liard

Alternative: PU2-G-400-4

Water Surface Elevations (feet - NAVD88 2004.65)

Planning Sub Unit	2010 (Base) Conditions						2060 (Future) Conditions					
	100-yr Event		400-year Event		1,000-yr Event		100-yr Event		400-year Event		1,000-yr Event	
	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project
Algiers	-3.8	-3.9	10.7	-3.9	12.1	-3.9	12.9	-3.9	16.3	-3.9	17.9	-3.9
Diamond	13.0	13.0	16.7	16.4	18.9	18.6	16.2	16.2	26.3	19.6	30.2	21.8
English_Turn	-1.7	-1.7	10.7	-1.7	12.1	-1.7	12.9	-1.7	16.3	-1.7	17.9	-1.7
Gainard_Woods	13.5	13.5	17.3	17.6	19.7	20.1	16.7	16.7	20.5	20.8	22.9	23.3
Grand_Liard	15.0	15.0	16.7	16.4	18.9	18.6	18.2	18.2	26.3	19.6	30.2	21.8
Jean_Lafitte	8.4	1.0	11.9	3.4	14.0	8.5	13.0	1.0	16.9	3.4	19.3	8.5
JEFF_7a	7.7	4.5	10.8	7.2	13.1	9.8	12.8	7.7	17.1	10.4	18.2	13.0
JEFF_7c	8.4	12.0	11.9	15.5	14.0	17.6	22.7	15.2	27.6	18.7	30.0	20.8
LAFO_11b	11.6	11.4	14.5	14.6	16.1	16.3	14.4	14.6	16.9	17.8	18.4	19.5
LAFO_3a	3.9	3.2	5.1	4.3	6.0	5.1	7.0	6.4	8.2	7.5	9.0	8.3
LAFO_5d	5.8	1.1	8.7	1.2	10.9	2.4	10.6	1.1	13.4	1.2	15.1	2.4
LAFO_7c	7.1	10.2	9.1	12.2	10.3	13.5	12.0	13.4	14.2	15.4	15.4	16.7
LAFO_7e	8.1	1.1	11.3	1.2	13.4	2.4	12.5	1.1	15.3	1.2	17.3	2.4
Larose	-2.5	-2.9	9.0	-2.6	12.0	-1.5	15.0	-2.9	15.0	-2.6	15.0	-1.5
Luling	6.1	1.5	8.6	2.0	10.2	3.7	11.8	1.5	15.5	2.0	17.4	3.7
Myrtle_Grove	10.3	9.4	13.8	11.7	15.7	12.8	13.5	12.6	17.3	14.9	18.6	16.0
Ollie	8.0	8.0	13.2	16.0	15.3	18.1	11.2	11.2	19.2	19.2	22.1	21.3
PLAQ_11a	12.5	12.5	16.7	16.4	18.9	18.6	15.9	15.7	20.5	19.6	22.9	21.8
Plaq_Belle_Chase	-2.6	-2.8	11.0	-2.7	11.3	-2.5	11.6	-2.8	14.3	-2.7	15.8	-2.5
St_Charles_dav_pond	1.6	1.5	4.8	1.5	11.0	1.6	11.0	1.5	13.2	1.5	14.5	1.6
St_Charles_Sunset	7.0	-5.1	9.4	-4.7	10.7	-2.6	10.0	-5.1	12.3	-4.7	13.7	-2.6
Sunrise	15.0	15.0	16.7	16.4	18.9	18.6	18.2	18.2	26.3	19.6	30.2	21.8
West_jeff_ames	-1.5	-1.5	11.0	-1.5	11.3	-1.3	11.6	-1.5	14.3	-1.5	15.8	-1.3
West_jeff_EoH	-3.5	-3.7	11.0	-3.7	11.3	-3.7	11.6	-3.7	14.3	-3.7	15.8	-3.7
West_jeff_harvey	-2.4	-2.5	11.0	-2.5	11.3	-2.5	11.6	-2.5	14.3	-2.5	15.8	-2.5
West_jeff_segnette	-3.9	-4.0	11.0	-4.0	11.3	-4.0	11.6	-4.0	14.3	-4.0	15.8	-4.0

Evaluation Parameters				
	Confidence Level:	90%	Levee Design:	No Friction Waves
	Future Relative Sea Level Rise:	3.2 feet	Levee Overtopping:	No Friction Waves

Planning Unit:	2	Alt. No.:	PU2-G-1000-4	Category:	Coastal Restoration + Structural Measures
Alternative Description:	Sustain coastal landscape through restoration. Similar structural features as PU2-R-1000-4 but with additional barrier-weir and levees along the GIWW to reduce risk to areas within the Barataria Basin. Also reduces risk to the Lafitte area.				
Coastal Component:	R2 (pulsed diversions)		Nonstructural Component:		None
Structural Component:	See alternative description above.				

Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	2,961	14,073	343	630	1,303	95	502	27	9
		Mid		17,138	688	1,094	2,760	195	449	27	9
		Low		18,021	839	1,327	3,261	221	396	25	8
2	High RSLR High Employment Dispersed Population	High	2,969	14,977	481	900	1,970	155	502	27	9
		Mid		17,429	746	1,173	2,844	203	449	27	9
		Low		18,219	884	1,377	3,343	230	396	24	8
3	Low RSLR Business-as-Usual Compact Population	High	2,961	9,277	318	580	1,193	83	502	27	9
		Mid		12,072	640	931	2,414	161	449	27	9
		Low		12,905	772	1,095	2,812	179	396	25	8
4	High RSLR Business-as-Usual Compact Population	High	2,969	9,942	430	761	1,663	127	502	27	9
		Mid		12,250	677	986	2,496	169	449	27	9
		Low		13,026	798	1,142	2,880	187	396	24	8

Other Results			Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Construction Time (years)		13	After 50 yrs (% of baseline)	103	99	103	99
Direct Wetland Impacts (acres)		9,500	After 100 yrs (% of baseline)	110	104	110	104
Indirect Impacts (unitless)		-8	Present Value of Life Cycle Costs ($ Millions)				
Spatial Integrity (unitless)		0.36	Coastal Component	15,657	15,689	15,657	15,689
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)	Nonstructural Component	0	0	0	0
	1 / 2	20,650	Structural Component	42,335	42,457	42,335	42,457
	3 / 4	20,650	Total Project	57,992	58,146	57,992	58,146

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 2
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		Structural Plan
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	GIWW Alt
10-year	1,583	959	2,834	1,352	1,512	800	2,129	1,061	1000-year Design
100-year	46,652	3,208	49,467	4,085	37,218	2,813	39,133	3,271	
400-year	51,671	5,103	53,124	5,977	40,614	3,491	41,659	3,802	
1,000-year	53,208	6,424	54,188	7,251	41,777	3,799	42,556	4,035	
2,000-year	53,965	7,228	54,716	7,703	42,386	4,081	42,963	4,288	

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price level

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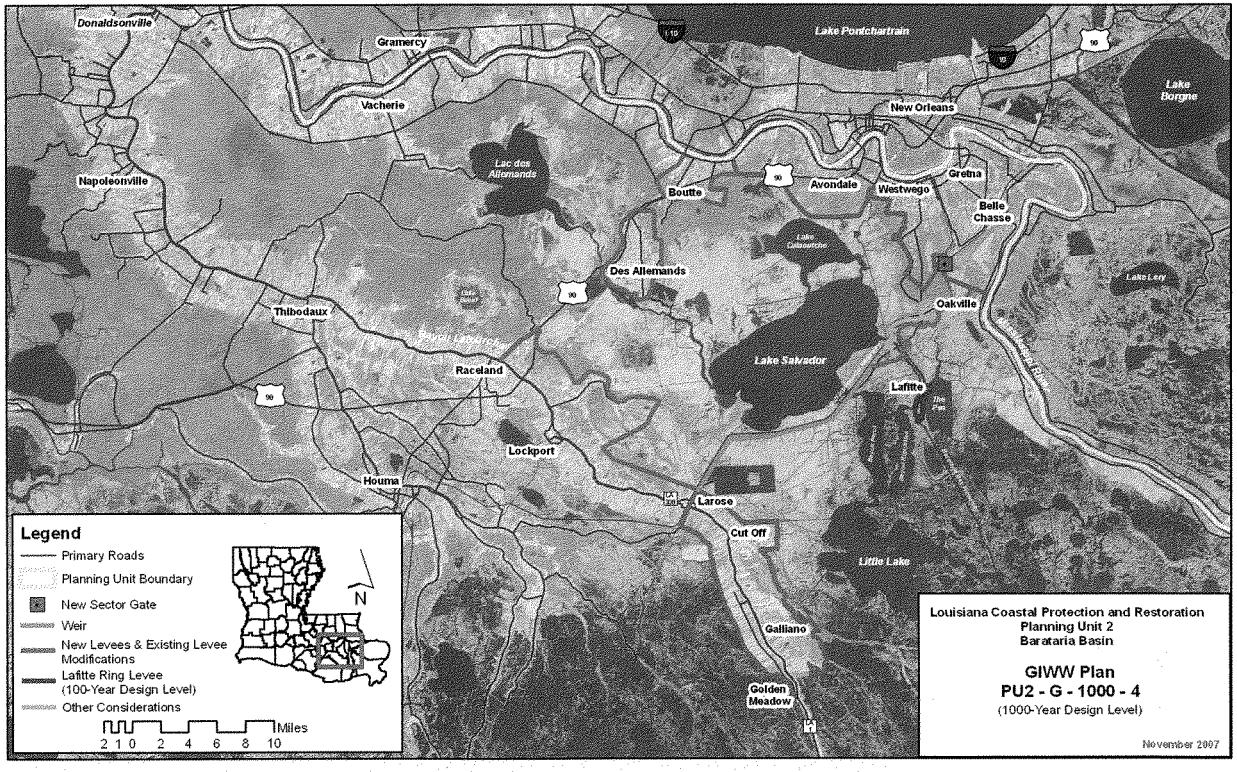
Donaldsonville
Gramercy
Vacherie
Napoleonville
Lac des Allemands
Lake Pontchartrain
Lake Borgne
New Orleans
Boutte
Avondale
Westwego
Gretna
Belle Chasse
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Other Considerations
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2 1 0 2 4 6 8 10
Louisiana Coastal Protection and Restoration
Planning Unit 2
Barataria Basin
GIWW Plan
PU2 - G - 1000 - 4
(1000-Year Design Level)
November 2007

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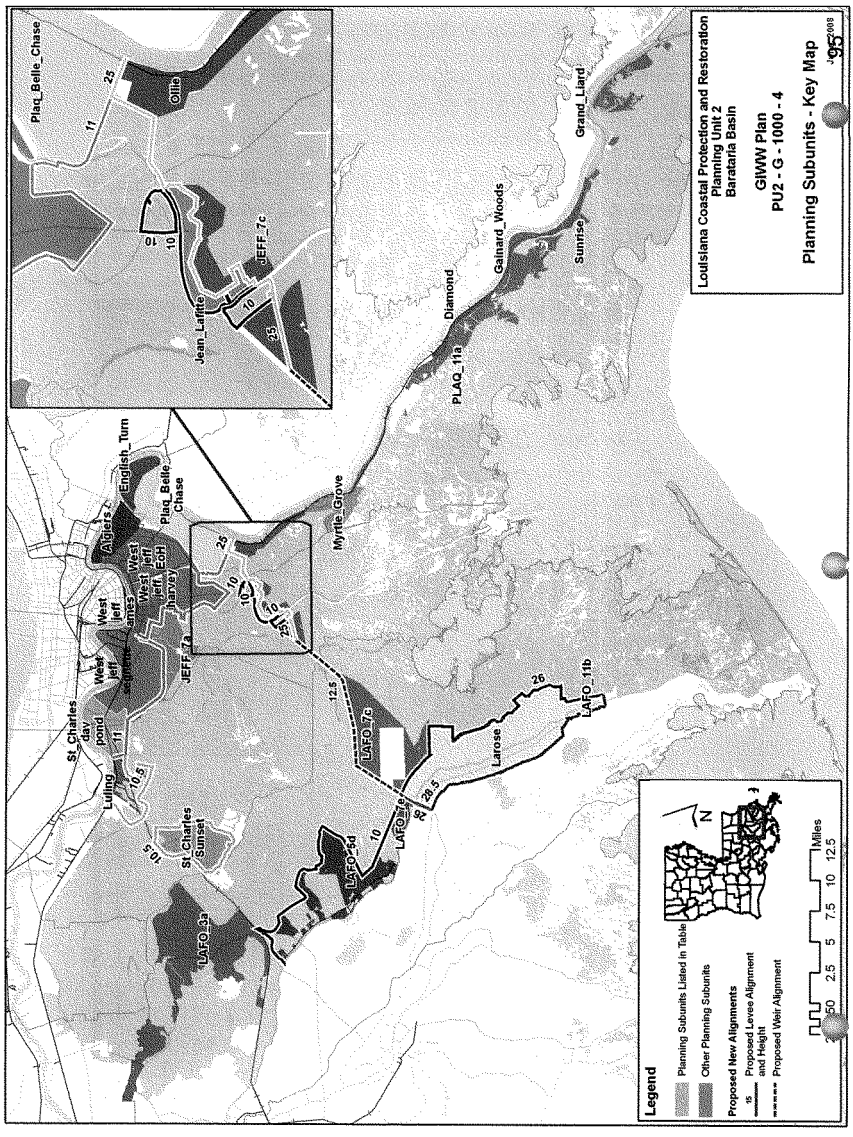
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Jean_Lafitte
JEFF_7c
Ollie
Grand_Liard
Galnard_Woods
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PLAQ_11a
Myrtle_Grove
English_Turn
Algiers
Plaq_Belle_Chase
West jeff harvey
West jeff EoH
West jeff ames
West jeff segnette
JEFF_7a
St_Charles day pond
Luling
St_Charles Sunset
LAFO_3a
LAFO_5d
LAFO_7e
LAFO_7c
Larose
LAFO_11b

Alternative: PU2-G-1000-4

Water Surface Elevations (feet - NAVD88 2004.65)

Planning Sub Unit	2010 (Base) Conditions						2060 (Future) Conditions					
	100-yr Event		400-year Event		1,000-yr Event		100-yr Event		400-year Event		1,000-yr Event	
	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project
Algiers	-3.8	-3.9	10.7	-3.9	12.1	-3.9	12.9	-3.9	16.3	-3.9	17.9	-3.9
Diamond	13.0	13.0	16.7	16.4	18.9	18.6	16.2	16.2	26.3	19.6	30.2	21.8
English_Turn	-1.7	-1.7	10.7	-1.7	12.1	-1.7	12.9	-1.7	16.3	-1.7	17.9	-1.7
Gainard_Woods	13.5	13.5	17.3	17.6	19.7	20.1	16.7	16.7	20.5	20.8	22.9	23.3
Grand_Liard	15.0	15.0	16.7	16.4	18.9	18.6	18.2	18.2	26.3	19.6	30.2	21.8
Jean_Lafitte	8.4	0.9	11.9	1.4	14.0	3.7	13.0	0.9	16.9	1.4	19.3	3.7
JEFF_7a	7.7	4.5	10.8	7.2	13.1	9.8	12.8	7.7	17.1	10.4	18.2	13.0
JEFF_7c	8.4	12.0	11.9	15.5	14.0	17.6	22.7	15.2	27.6	18.7	30.0	20.8
LAFO_11b	11.6	11.4	14.5	14.6	16.1	16.3	14.4	14.6	16.9	17.8	18.4	19.5
LAFO_3a	3.9	3.2	5.1	4.3	6.0	5.1	7.0	6.4	8.2	7.5	9.0	8.3
LAFO_5d	5.8	1.1	8.7	1.1	10.9	1.3	10.6	1.1	13.4	1.1	15.1	1.3
LAFO_7c	7.1	10.2	9.1	12.2	10.3	13.5	12.0	13.4	14.2	15.4	15.4	16.7
LAFO_7e	8.1	1.1	11.3	1.1	13.4	1.3	12.5	1.1	15.3	1.1	17.3	1.3
Larose	-2.5	-2.9	9.0	-2.8	12.0	-2.7	15.0	-2.9	15.0	-2.8	15.0	-2.7
Luling	6.1	1.5	8.6	1.6	10.2	2.1	11.8	1.5	15.5	1.6	17.4	2.1
Myrtle_Grove	10.3	9.4	13.8	11.7	15.7	12.8	13.5	12.6	17.3	14.9	18.6	16.0
Ollie	8.0	8.0	13.2	16.0	15.3	18.1	11.2	11.2	19.2	19.2	22.1	21.3
PLAQ_11a	12.5	12.5	16.7	16.4	18.9	18.6	15.9	15.7	20.5	19.6	22.9	21.8
Plaq_Belle_Chase	-2.6	-2.8	11.0	-2.7	11.3	-2.7	11.6	-2.8	14.3	-2.7	15.8	-2.7
St_Charles_dav_pond	1.6	1.5	4.8	1.5	11.0	1.6	11.0	1.5	13.2	1.5	14.5	1.6
St_Charles_Sunset	7.0	-5.1	9.4	-5.0	10.7	-4.6	10.0	-5.1	12.3	-5.0	13.7	-4.6
Sunrise	15.0	15.0	16.7	16.4	18.9	18.6	18.2	18.2	26.3	19.6	30.2	21.8
West_jeff_ames	-1.5	-1.5	11.0	-1.5	11.3	-1.3	11.6	-1.5	14.3	-1.5	15.8	-1.3
West_jeff_EoH	-3.5	-3.7	11.0	-3.7	11.3	-3.7	11.6	-3.7	14.3	-3.7	15.8	-3.7
West_jeff_harvey	-2.4	-2.5	11.0	-2.5	11.3	-2.5	11.6	-2.5	14.3	-2.5	15.8	-2.5
West_jeff_segnette	-3.9	-4.0	11.0	-4.0	11.3	-4.0	11.6	-4.0	14.3	-4.0	15.8	-4.0

Evaluation Parameters				
	Confidence Level:	90%	Levee Design:	No Friction Waves
	Future Relative Sea Level Rise:	3.2 feet	Levee Overtopping:	No Friction Waves

Planning Unit:	2	Alt. No.:	PU2-C-WBI-100-1	Category:	Comprehensive (Coastal+Structural+Nonstructural)
Alternative Description:	Comprehensive plan--Same coastal and structural measures as Alternative PU2-WBI-100-1 but with complementary nonstructural measures to reduce residual risk.				
Coastal Component:	R2 (pulsed diversions)		Nonstructural Component:		100-yr complementary measures
Structural Component:	Same as Alternative PU2-WBI-100-1				

Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	1,065	14,954	200	290	637	47	266	17	8
		Mid		18,200	459	794	1,984	142	213	15	7
		Low		20,047	739	1,182	3,055	211	160	14	6
2	High RSLR High Employment Dispersed Population	High	1,068	15,428	288	500	1,137	95	266	15	7
		Mid		18,493	537	911	2,186	162	213	14	7
		Low		20,265	827	1,303	3,272	236	160	13	6
3	Low RSLR Business-as-Usual Compact Population	High	1,072	10,244	180	267	611	44	266	17	8
		Mid		13,205	412	668	1,761	118	213	15	7
		Low		15,036	650	1,004	2,703	177	160	14	6
4	High RSLR Business-as-Usual Compact Population	High	1,075	10,613	243	461	991	80	266	15	7
		Mid		13,392	468	827	1,986	142	213	14	7
		Low		15,126	711	1,158	2,871	197	160	13	6

Other Results			Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Construction Time (years)		6	After 50 yrs (% of baseline)	103	99	103	99
Direct Wetland Impacts (acres)		0	After 100 yrs (% of baseline)	110	104	110	104
Indirect Impacts (unitless)		2	Present Value of Life Cycle Costs ($ Millions)				
Spatial Integrity (unitless)		0.36	Coastal Component	15,657	15,689	15,657	15,689
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)	Nonstructural Component	4,218	4,218	4,348	4,348
	1 / 2	7,334 / 7,354	Structural Component	999	1,024	999	1,024
	3 / 4	7,379 / 7,399	Total Project	20,874	20,930	21,004	21,060

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 2
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	Comprehensive Plan
10-year	1,583	650	2,834	1,775	1,512	510	2,129	1,002	
100-year	46,652	3,493	49,467	5,734	37,218	2,289	39,133	4,211	West Bank Alt
400-year	51,671	38,149	53,124	39,402	40,614	32,015	41,659	32,912	
1,000-year	53,208	42,170	54,188	43,093	41,777	35,034	42,556	35,646	100-year Design
2,000-year	53,965	43,451	54,716	44,242	42,386	35,961	42,963	36,479	

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price level.

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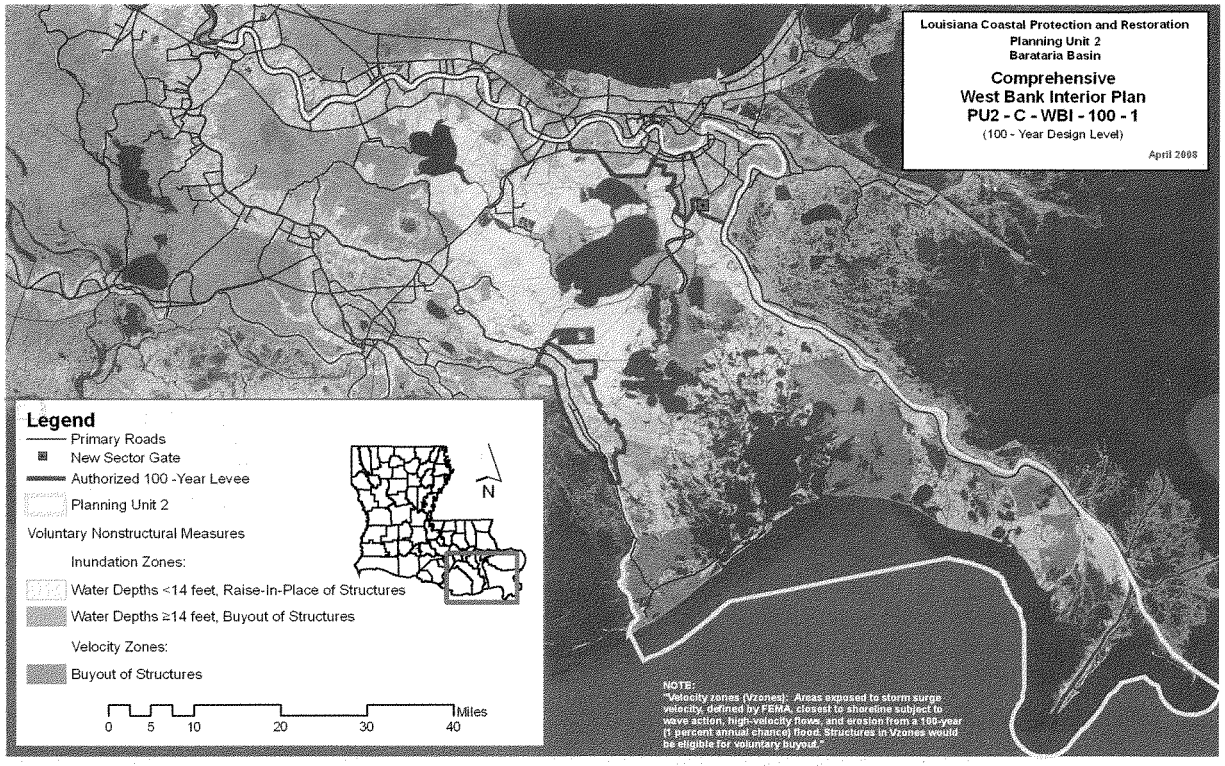
Louisiana Coastal Protection and Restoration
Planning Unit 2
Barataria Basin
Comprehensive
West Bank Interior Plan
PU2 - C - WBI - 100 - 1
(100 - Year Design Level)
April 2008
Legend
Primary Roads
New Sector Gate
Authorized 100 -Year Levee
Planning Unit 2
Voluntary Nonstructural Measures
Inundation Zones:
Water Depths <14 feet, Raise-In-Place of Structures
Water Depths ≥14 feet, Buyout of Structures
Velocity Zones:
Buyout of Structures
N
0 5 10 20 30 40 Miles
NOTE:
"Velocity zones (Vzones): Areas exposed to storm surge velocity, defined by FEMA, closest to shoreline subject to wave action, high-velocity flows, and erosion from a 100-year (1 percent annual chance) flood. Structures in Vzones would be eligible for voluntary buyout."

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Planning Unit:	2	Alt. No.:	PU2-C-WBI-400-1	Category:	Comprehensive (Coastal+Structural+Nonstructural)
Alternative Description:	Comprehensive plan--Same coastal and structural measures as Alternative PU2-WBI-400-1 but with complementary nonstructural measures to reduce residual risk.				
Coastal Component:	R2 (pulsed diversions)		Nonstructural Component:		400-yr complementary measures
Structural Component:	Same as Alternative PU2-WBI-400-1				

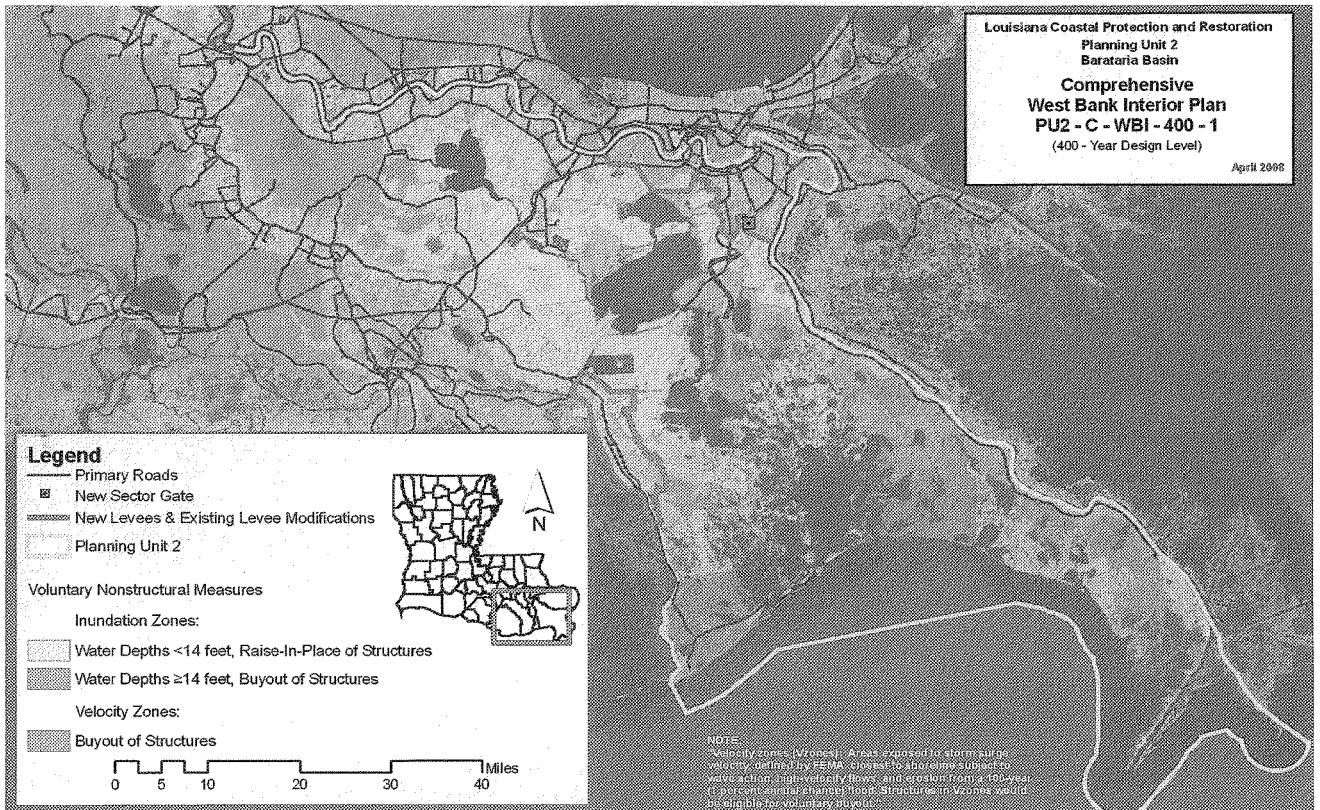
Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	1,912	15,094	216	310	707	57	266	26	9
		Mid		18,072	480	721	1,930	145	213	26	9
		Low		19,210	605	869	2,337	167	160	25	8
2	High RSLR High Employment Dispersed Population	High	1,914	15,917	335	528	1,310	112	266	26	9
		Mid		18,389	531	783	2,021	154	213	25	9
		Low		19,407	662	1,019	2,575	193	160	23	8
3	Low RSLR Business-as-Usual Compact Population	High	1,997	10,433	197	278	636	49	266	26	9
		Mid		13,083	434	604	1,666	119	213	26	9
		Low		14,265	541	736	2,036	140	160	25	8
4	High RSLR Business-as-Usual Compact Population	High	2,000	11,061	293	454	1,084	91	266	26	9
		Mid		13,281	469	672	1,770	130	213	25	9
		Low		14,350	574	911	2,259	164	160	23	8

Other Results			Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Construction Time (years)		12	After 50 yrs (% of baseline)	103	99	103	99
Direct Wetland Impacts (acres)		3,700	After 100 yrs (% of baseline)	110	104	110	104
Indirect Impacts (unitless)		2	Present Value of Life Cycle Costs ($ Millions)				
Spatial Integrity (unitless)		0.36	Coastal Component	15,657	15,689	15,657	15,689
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)	Nonstructural Component	3,491	3,491	5,161	5,161
	1 / 2	13,686	Structural Component	18,294	18,319	18,294	18,319
	3 / 4	14,270	Total Project	37,442	37,499	39,112	39,169

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 2
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		Comprehensive Plan
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	West Bank Alt
10-year	1,583	351	2,834	672	1,512	296	2,129	490	400-year Design
100-year	46,652	629	49,467	1,933	37,218	547	39,133	1,145	
400-year	51,671	3,900	53,124	5,689	40,614	2,673	41,659	4,409	
1,000-year	53,208	10,662	54,188	12,005	41,777	8,317	42,556	9,194	
2,000-year	53,965	29,791	54,716	30,867	42,386	25,438	42,963	26,219	

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels.

1851


Louisiana Coastal Protection and Restoration
Planning Unit 2
Barataria Basin
Comprehensive
West Bank Interior Plan
PU2 - C - WBI - 400 - 1
(400 - Year Design Level)
April 2008
Legend
Primary Roads
New Sector Gate
New Levees & Existing Levee Modifications
Planning Unit 2
Voluntary Nonstructural Measures
Inundation Zones:
Water Depths <14 feet, Raise-In-Place of Structures
Water Depths ≥14 feet, Buyout of Structures
Velocity Zones:
Buyout of Structures
N
0 5 10 20 30 40 Miles

1852

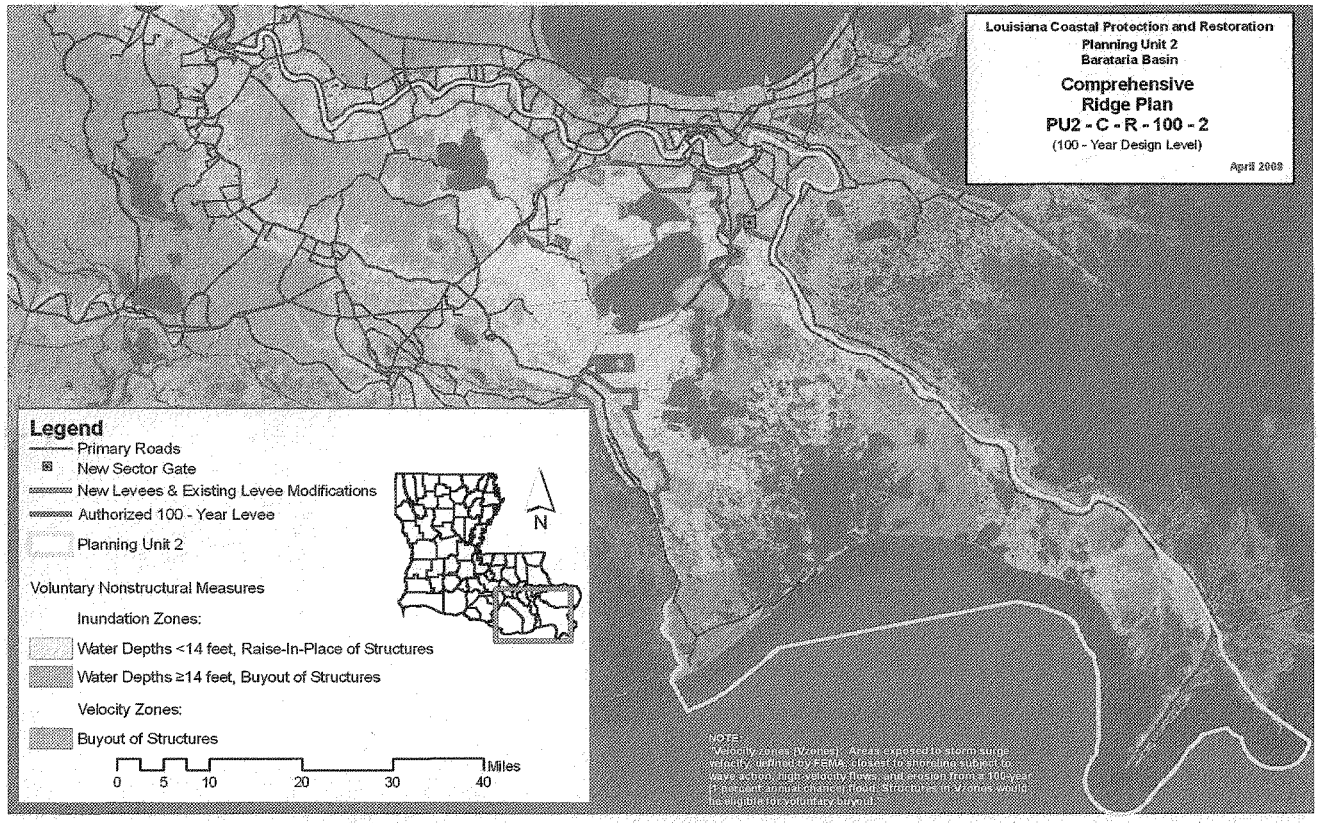
Planning Unit:	2	Alt. No.:	PU2-C-R-100-2	Category:	Comprehensive (Coastal+Structural+Nonstructural)
Alternative Description:	Comprehensive plan--Same coastal and structural measures as Alternative PU2-R-100-2 but with complementary nonstructural measures to reduce residual risk.				
Coastal Component:	R2 (pulsed diversions)		Nonstructural Component:		100-yr complementary measures
Structural Component:	Same as Alternative PU2-R-100-2				

Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	1,366	14,215	229	333	758	59	449	17	8
		Mid		17,793	556	937	2,403	176	266	15	7
		Low		19,510	821	1,245	3,367	233	160	14	6
2	High RSLR High Employment Dispersed Population	High	1,370	14,942	350	594	1,408	122	449	15	7
		Mid		18,087	624	987	2,503	185	266	14	7
		Low		19,688	886	1,302	3,493	246	160	13	6
3	Low RSLR Business-as-Usual Compact Population	High	1,368	9,506	203	289	676	50	449	17	8
		Mid		12,718	495	735	2,033	139	266	15	7
		Low		14,404	719	1,000	2,880	186	160	14	6
4	High RSLR Business-as-Usual Compact Population	High	1,371	10,036	295	478	1,106	93	449	15	7
		Mid		12,876	540	785	2,121	147	266	14	7
		Low		14,481	759	1,048	2,936	192	160	13	6

Other Results			Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Construction Time (years)		11	After 50 yrs (% of baseline)	103	99	103	99
Direct Wetland Impacts (acres)		700	After 100 yrs (% of baseline)	110	104	110	104
Indirect Impacts (unitless)		4	Present Value of Life Cycle Costs ($ Millions)				
Spatial Integrity (unitless)		0.36	Coastal Component	15,657	15,689	15,657	15,689
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)	Nonstructural Component	3,369	3,369	3,402	3,402
	1 / 2	9,485	Structural Component	7,730	7,770	7,730	7,770
	3 / 4	9,496	Total Project	26,756	26,828	26,788	26,861
		9,522					

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 2 Comprehensive Plan Ridge Alt 100-year Design
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	
10-year	1,583	361	2,834	1,205	1,512	262	2,129	469	
100-year	46,652	2,783	49,467	4,430	37,218	1,637	39,133	2,977	
400-year	51,671	37,566	53,124	38,571	40,614	31,510	41,659	32,136	
1,000-year	53,208	41,457	54,188	42,230	41,777	34,342	42,556	34,785	
2,000-year	53,965	42,668	54,716	43,327	42,386	35,178	42,963	35,544	

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels.


Louisiana Coastal Protection and Restoration
Planning Unit 2
Barataria Basin
Comprehensive
Ridge Plan
PU2 - C - R - 100 - 2
(100 - Year Design Level)
April 2008
Legend
Primary Roads
New Sector Gate
New Levees & Existing Levee Modifications
Authorized 100 - Year Levee
Planning Unit 2
Voluntary Nonstructural Measures
Inundation Zones:
Water Depths <14 feet, Raise-In-Place of Structures
Water Depths ≥14 feet, Buyout of Structures
Velocity Zones:
Buyout of Structures
N
0 5 10 20 30 40
Miles

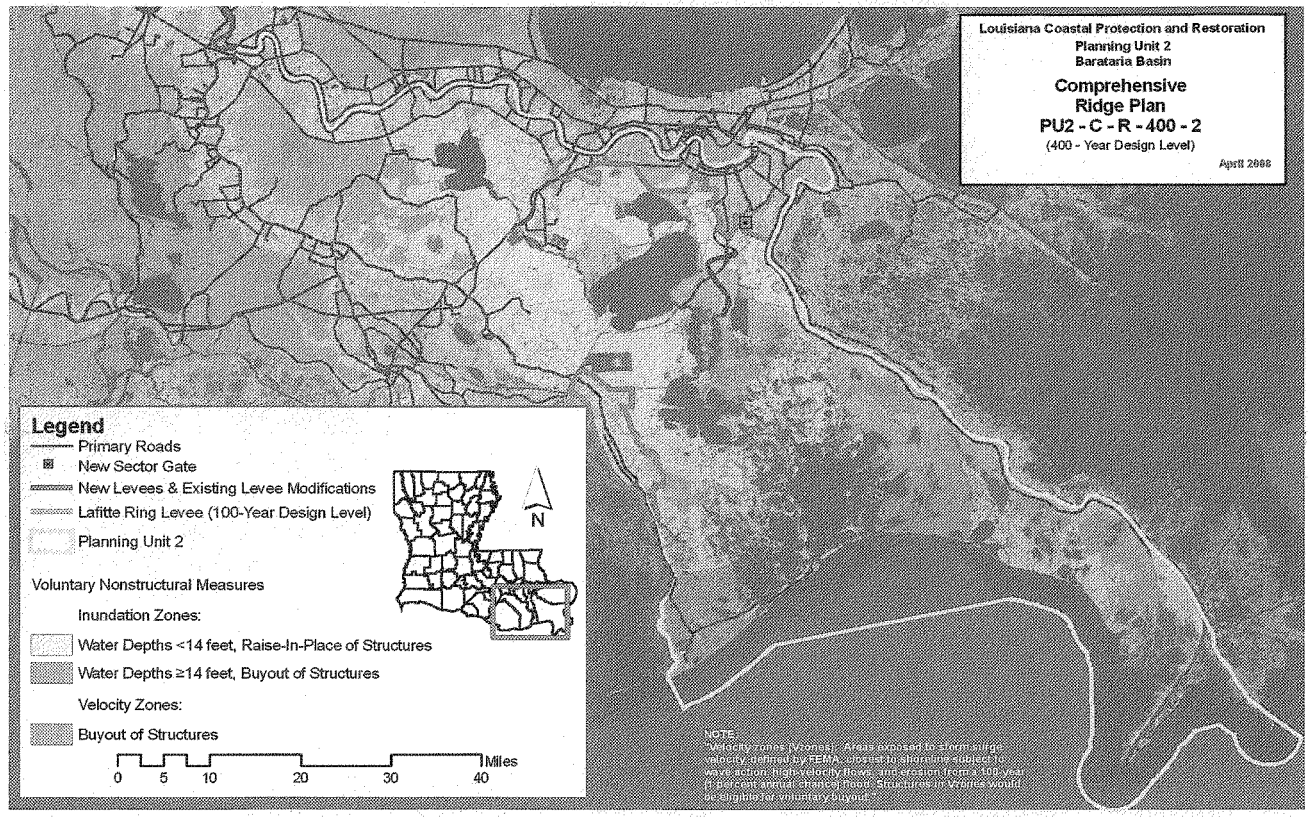
Planning Unit:	2	Alt. No.:	PU2-C-R-400-2	Category:	Comprehensive (Coastal+Structural+Nonstructural)
Alternative Description:	Comprehensive plan--Same coastal and structural measures as Alternative PU2-R-400-2 but with complementary nonstructural measures to reduce residual risk.				
Coastal Component:	R2 (pulsed diversions)		Nonstructural Component:		400-yr complementary measures
Structural Component:	Same as Alternative PU2-R-400-2				

Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	2,233	14,201	226	325	750	60	266	26	9
		Mid		17,159	512	765	2,068	155	213	26	9
		Low		18,227	642	909	2,481	177	160	25	8
2	High RSLR High Employment Dispersed Population	High	2,240	15,069	353	553	1,383	119	266	26	9
		Mid		17,471	560	817	2,150	163	213	25	9
		Low		18,406	689	1,003	2,642	192	160	23	8
3	Low RSLR Business-as-Usual Compact Population	High	2,302	9,509	206	290	667	52	266	26	9
		Mid		12,110	463	626	1,767	125	213	26	9
		Low		13,199	575	751	2,130	143	160	25	8
4	High RSLR Business-as-Usual Compact Population	High	2,309	10,146	309	459	1,112	94	266	26	9
		Mid		12,279	495	677	1,853	133	213	25	9
		Low		13,277	600	834	2,251	155	160	23	8

Other Results		Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Construction Time (years)	13	After 50 yrs (% of baseline)	103	99	103	99
Direct Wetland Impacts (acres)	4,400	After 100 yrs (% of baseline)	110	104	110	104
Indirect Impacts (unitless)	4	Present Value of Life Cycle Costs ($ Millions)				
Spatial Integrity (unitless)	0.36	Coastal Component	15,657	15,689	15,657	15,689
Non-Federal Share of Present Value of Life Cycle Costs	Scenario / ($ Millions)	Nonstructural Component	2,660	2,660	4,028	4,028
	1 / 2: 15,894 / 15,942	Structural Component	25,409	25,515	25,409	25,515
	3 / 4: 16,373 / 16,421	Total Project	43,725	43,863	45,094	45,232

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 2 Comprehensive Plan Ridge Alt 400-year Design
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	
10-year	1,583	249	2,834	396	1,512	197	2,129	244	
100-year	46,652	486	49,467	1,450	37,218	420	39,133	715	
400-year	51,671	2,869	53,124	4,392	40,614	1,705	41,659	2,982	
1,000-year	53,208	9,147	54,188	10,221	41,777	6,868	42,556	7,456	
2,000-year	53,965	28,398	54,716	29,262	42,386	24,117	42,963	24,664	

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels.


Louisiana Coastal Protection and Restoration
Planning Unit 2
Barataria Basin
Comprehensive
Ridge Plan
PU2 - C - R - 400 - 2
(400 - Year Design Level)
April 2008
Legend
Primary Roads
New Sector Gate
New Levees & Existing Levee Modifications
Lafitte Ring Levee (100-Year Design Level)
Planning Unit 2
Voluntary Nonstructural Measures
Inundation Zones:
Water Depths <14 feet, Raise-In-Place of Structures
Water Depths ≥14 feet, Buyout of Structures
Velocity Zones:
Buyout of Structures
N
0 5 10 20 30 40 Miles
NOTE:
Velocity zones (V zones): Areas exposed to storm surge velocity defined by FEMA, coastal high hazard zone subject to wave action, high velocity flows, and erosion from a 100-year (1 percent annual chance) storm. Structures in V zones would be eligible for voluntary buyouts.

Planning Unit:	2	Alt. No.:	PU2-C-R-100-3	Category:	Comprehensive (Coastal+Structural+Nonstructural)
Alternative Description:	Comprehensive plan--Same coastal and structural measures as Alternative PU2-R-100-3 but with complementary nonstructural measures to reduce residual risk.				
Coastal Component:	R2 (pulsed diversions)		Nonstructural Component:		100-yr complementary measures
Structural Component:	Same as Alternative PU2-R-100-3				

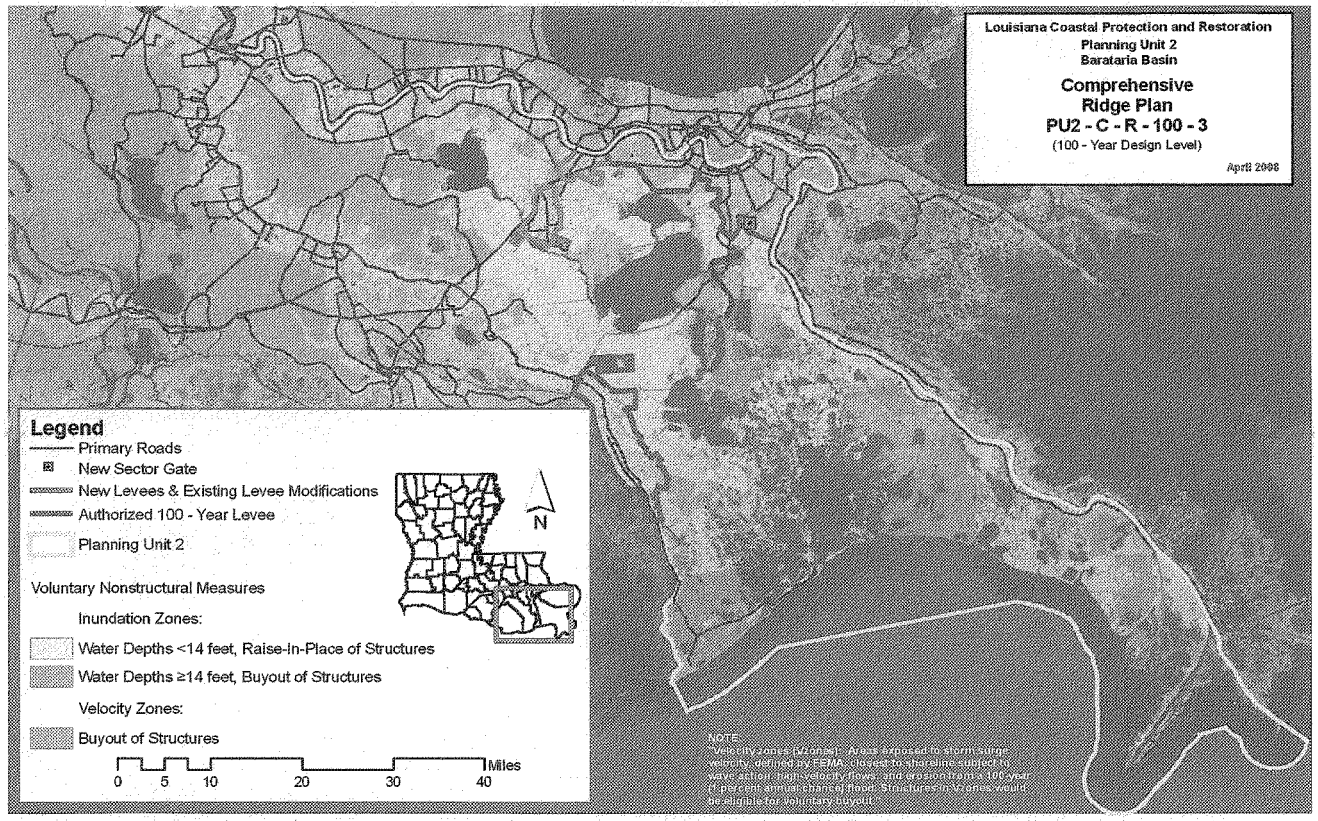
Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	1,471	13,324	226	327	755	58	449	17	7
		Mid		16,902	551	918	2,368	172	266	15	7
		Low		18,650	814	1,228	3,340	228	160	14	6
2	High RSLR High Employment Dispersed Population	High	1,476	14,051	343	574	1,372	116	449	15	7
		Mid		17,197	614	968	2,469	180	266	14	7
		Low		18,828	873	1,284	3,466	242	160	13	6
3	Low RSLR Business-as-Usual Compact Population	High	1,471	8,914	203	285	679	50	449	17	7
		Mid		12,115	494	723	2,031	137	266	15	7
		Low		13,823	717	991	2,882	184	160	14	6
4	High RSLR Business-as-Usual Compact Population	High	1,475	9,443	293	466	1,099	90	449	15	7
		Mid		12,273	536	773	2,119	145	266	14	7
		Low		13,899	753	1,038	2,938	191	160	13	6

Other Results			Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Construction Time (years)		11	After 50 yrs (% of baseline)	103	99	103	99
Direct Wetland Impacts (acres)		1,000	After 100 yrs (% of baseline)	110	104	110	104
Indirect Impacts (unitless)		4	Present Value of Life Cycle Costs ($ Millions)				
Spatial Integrity (unitless)		0.36	Coastal Component	15,657	15,689	15,657	15,689
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)	Nonstructural Component	3,016	3,016	3,008	3,008
	1 / 2	10,245	Structural Component	10,147	10,201	10,147	10,201
	3 / 4	10,242	Total Project	28,819	28,906	28,811	28,898

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 2
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	Comprehensive Plan
10-year	1,583	309	2,834	1,073	1,512	216	2,129	326	Ridge Alt
100-year	46,652	2,475	49,467	3,893	37,218	1,488	39,133	2,664	100-year Design
400-year	51,671	37,178	53,124	38,086	40,614	31,415	41,659	31,993	
1,000-year	53,208	41,243	54,188	41,946	41,777	34,355	42,556	34,765	
2,000-year	53,965	42,415	54,716	43,008	42,386	35,177	42,963	35,511	

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price level.

1857


Louisiana Coastal Protection and Restoration
Planning Unit 2
Barataria Basin
Comprehensive
Ridge Plan
PU2 - C - R - 100 - 3
(100 - Year Design Level)
April 2008
Legend
Primary Roads
New Sector Gate
New Levees & Existing Levee Modifications
Authorized 100 - Year Levee
Planning Unit 2
Voluntary Nonstructural Measures
Inundation Zones:
Water Depths <14 feet, Raise-In-Place of Structures
Water Depths ≥14 feet, Buyout of Structures
Velocity Zones:
Buyout of Structures
0 5 10 20 30 40 Miles
N
NOTE:
"Velocity zones (V zones): Areas exposed to storm surge velocity, defined by FEMA, closest to shoreline subject to wave action, high-velocity flows, and erosion from a 100-year (1 percent annual chance) flood. Structures in V zones would be eligible for voluntary buyout."

1858

Planning Unit:	2	Alt. No.:	PU2-C-R-400-3	Category:	Comprehensive (Coastal+Structural+Nonstructural)
Alternative Description:	Comprehensive plan--Same coastal and structural measures as Alternative PU2-R-400-3 but with complementary nonstructural measures to reduce residual risk.				
Coastal Component:	R2 (pulsed diversions)		Nonstructural Component:		400-yr complementary measures
Structural Component:	Same as Alternative PU2-R-400-3				

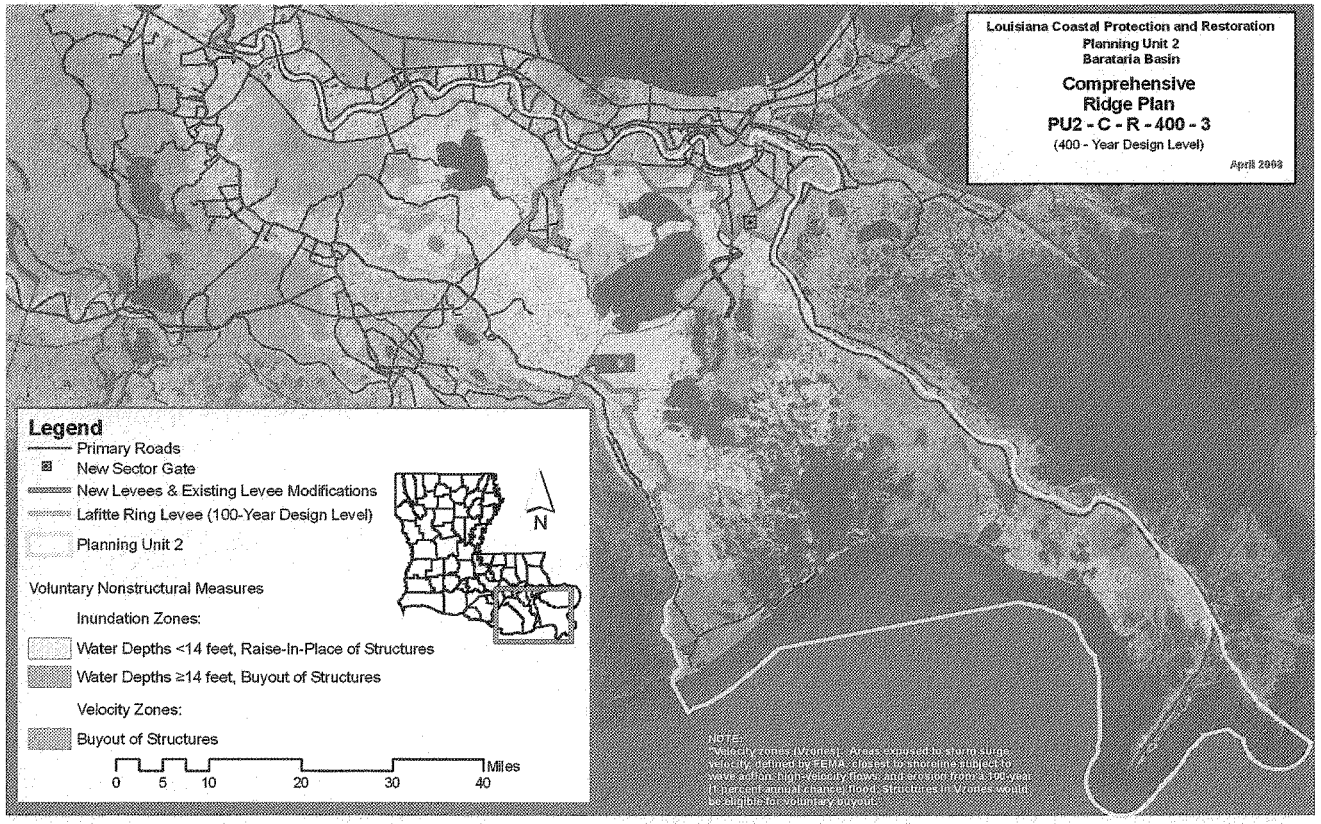
Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	2,373	12,988	205	289	670	52	449	26	9
		Mid		15,664	453	660	1,800	132	266	26	9
		Low		16,679	573	799	2,188	152	160	25	8
2	High RSLR High Employment Dispersed Population	High	2,381	13,715	308	477	1,181	99	449	26	9
		Mid		15,958	494	709	1,876	138	266	25	9
		Low		16,857	617	876	2,316	164	160	23	8
3	Low RSLR Business-as-Usual Compact Population	High	2,428	8,575	189	259	604	45	449	26	9
		Mid		10,933	413	543	1,557	107	266	26	9
		Low		11,975	517	662	1,899	124	160	25	8
4	High RSLR Business-as-Usual Compact Population	High	2,436	9,104	272	398	966	79	449	26	9
		Mid		11,090	440	588	1,637	114	266	25	9
		Low		12,051	539	731	2,005	135	160	23	8

Other Results			Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Construction Time (years)		11	After 50 yrs (% of baseline)	103	99	103	99
Direct Wetland Impacts (acres)		4,700	After 100 yrs (% of baseline)	110	104	110	104
Indirect Impacts (unitless)		4	Present Value of Life Cycle Costs ($ Millions)				
Spatial Integrity (unitless)		0.36	Coastal Component	15,657	15,689	15,657	15,689
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)	Nonstructural Component	2,510	2,510	3,578	3,578
	1 / 2	16,844 16,898	Structural Component	28,318	28,440	28,318	28,440
	3 / 4	17,218 17,272	Total Project	46,485	46,638	47,553	47,707

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 2
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	Comprehensive Plan
10-year	1,583	226	2,834	366	1,512	181	2,129	221	
100-year	46,652	444	49,467	1,354	37,218	386	39,133	661	Ridge Alt
400-year	51,671	2,584	53,124	3,923	40,614	1,530	41,659	2,680	
1,000-year	53,208	8,675	54,188	9,604	41,777	6,565	42,556	7,072	400-year Design
2,000-year	53,965	27,832	54,716	28,595	42,386	23,767	42,963	24,256	

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price level.

1859


Louisiana Coastal Protection and Restoration
Planning Unit 2
Barataria Basin
Comprehensive
Ridge Plan
PU2 - C - R - 400 - 3
(400 - Year Design Level)
April 2003
Legend
Primary Roads
New Sector Gate
New Levees & Existing Levee Modifications
Lafitte Ring Levee (100-Year Design Level)
Planning Unit 2
Voluntary Nonstructural Measures
Inundation Zones:
Water Depths <14 feet, Raise-In-Place of Structures
Water Depths ≥14 feet, Buyout of Structures
Velocity Zones:
Buyout of Structures
0 5 10 20 30 40 Miles
N
NOTE:
"Velocity zones (Vzones): Areas exposed to storm surge velocity, defined by FEMA, closest to shoreline subject to wave action, high-velocity flows, and erosion from a 100-year (1 percent annual chance) flood. Structures in Vzones would be eligible for voluntary buyout."

1860

Planning Unit:	2	Alt. No.:	PU2-C-R-100-4	Category:	Comprehensive (Coastal+Structural+Nonstructural)
Alternative Description:	Comprehensive plan--Same coastal and structural measures as Alternative PU2-R-100-4 but with complementary nonstructural measures to reduce residual risk.				
Coastal Component:	R2 (pulsed diversions)		Nonstructural Component:		100-yr complementary measures
Structural Component:	Same as Alternative PU2-R-100-4				

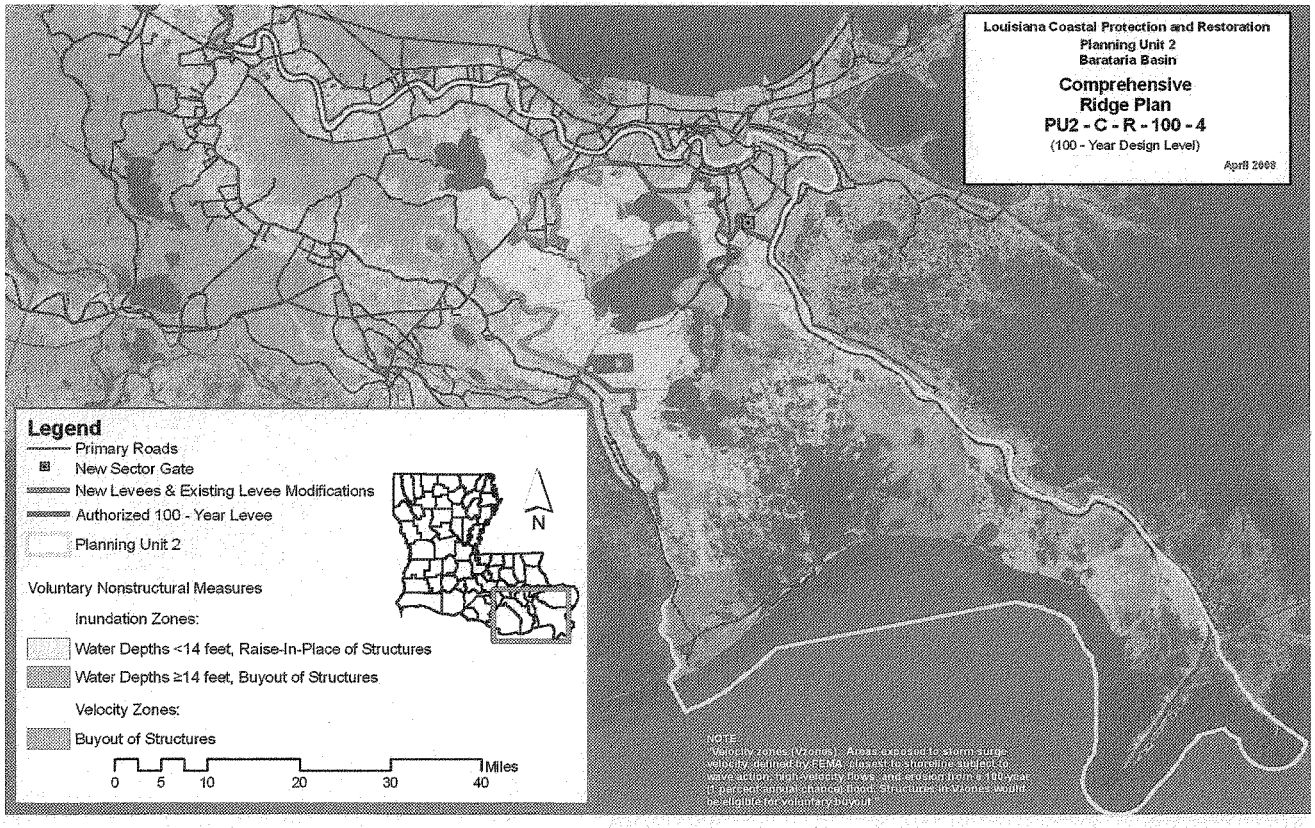
Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	1,626	12,971	226	321	752	57	277	17	8
		Mid		16,497	549	878	2,332	167	224	15	7
		Low		18,217	810	1,185	3,307	223	171	14	6
2	High RSLR High Employment Dispersed Population	High	1,631	13,650	340	530	1,334	111	277	15	7
		Mid		16,755	608	913	2,411	173	224	14	7
		Low		18,371	866	1,234	3,424	235	171	13	6
3	Low RSLR Business-as-Usual Compact Population	High	1,627	8,445	202	277	669	48	277	17	8
		Mid		11,604	491	680	1,969	130	224	15	7
		Low		13,231	709	944	2,817	176	171	14	6
4	High RSLR Business-as-Usual Compact Population	High	1,632	8,945	289	417	1,031	82	277	15	7
		Mid		11,741	525	713	2,035	136	224	14	7
		Low		13,296	737	977	2,861	181	171	13	6

Other Results			Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Construction Time (years)		11	After 50 yrs (% of baseline)	103	99	103	99
Direct Wetland Impacts (acres)		1,600	After 100 yrs (% of baseline)	110	104	110	104
Indirect Impacts (unitless)		4	Present Value of Life Cycle Costs ($ Millions)				
Spatial Integrity (unitless)		0.36	Coastal Component	15,657	15,689	15,657	15,689
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)	Nonstructural Component	2,838	2,838	2,866	2,866
	1 / 2	11,299 11,336	Structural Component	13,348	13,420	13,348	13,420
	3 / 4	11,309 11,346	Total Project	31,843	31,947	31,871	31,975

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 2
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	Comprehensive Plan
10-year	1,583	288	2,834	1,034	1,512	210	2,129	308	Ridge Alt
100-year	46,652	2,293	49,467	3,554	37,218	1,177	39,133	1,963	100-year Design
400-year	51,671	36,990	53,124	37,779	40,614	30,738	41,659	31,163	
1,000-year	53,208	40,879	54,188	41,462	41,777	33,481	42,556	33,744	
2,000-year	53,965	41,942	54,716	42,447	42,386	34,174	42,963	34,395	

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price level.

1861


Louisiana Coastal Protection and Restoration
Planning Unit 2
Barataria Basin
Comprehensive
Ridge Plan
PU2 - C - R - 100 - 4
(100 - Year Design Level)
April 2008
Legend
Primary Roads
New Sector Gate
New Levees & Existing Levee Modifications
Authorized 100 - Year Levee
Planning Unit 2
Voluntary Nonstructural Measures
Inundation Zones:
Water Depths <14 feet, Raise-In-Place of Structures
Water Depths ≥14 feet, Buyout of Structures
Velocity Zones:
Buyout of Structures
N
0 5 10 20 30 40 Miles
NOTE
Velocity zones (Vzones) - Areas exposed to storm surge velocity, defined by FEMA, closest to shoreline subject to wave action, high velocity flows, and erosion from a 100-year (1 percent annual chance) flood. Structures in Vzones would be eligible for voluntary buyout.

1862

Planning Unit:	2	Alt. No.:	PU2-C-R-400-4	Category:	Comprehensive (Coastal+Structural+Nonstructural)
Alternative Description:	Comprehensive plan--Same coastal and structural measures as Alternative PU2-R-400-4 but with complementary nonstructural measures to reduce residual risk.				
Coastal Component:	R2 (pulsed diversions)		Nonstructural Component:		400-yr complementary measures
Structural Component:	Same as Alternative PU2-R-400-4				

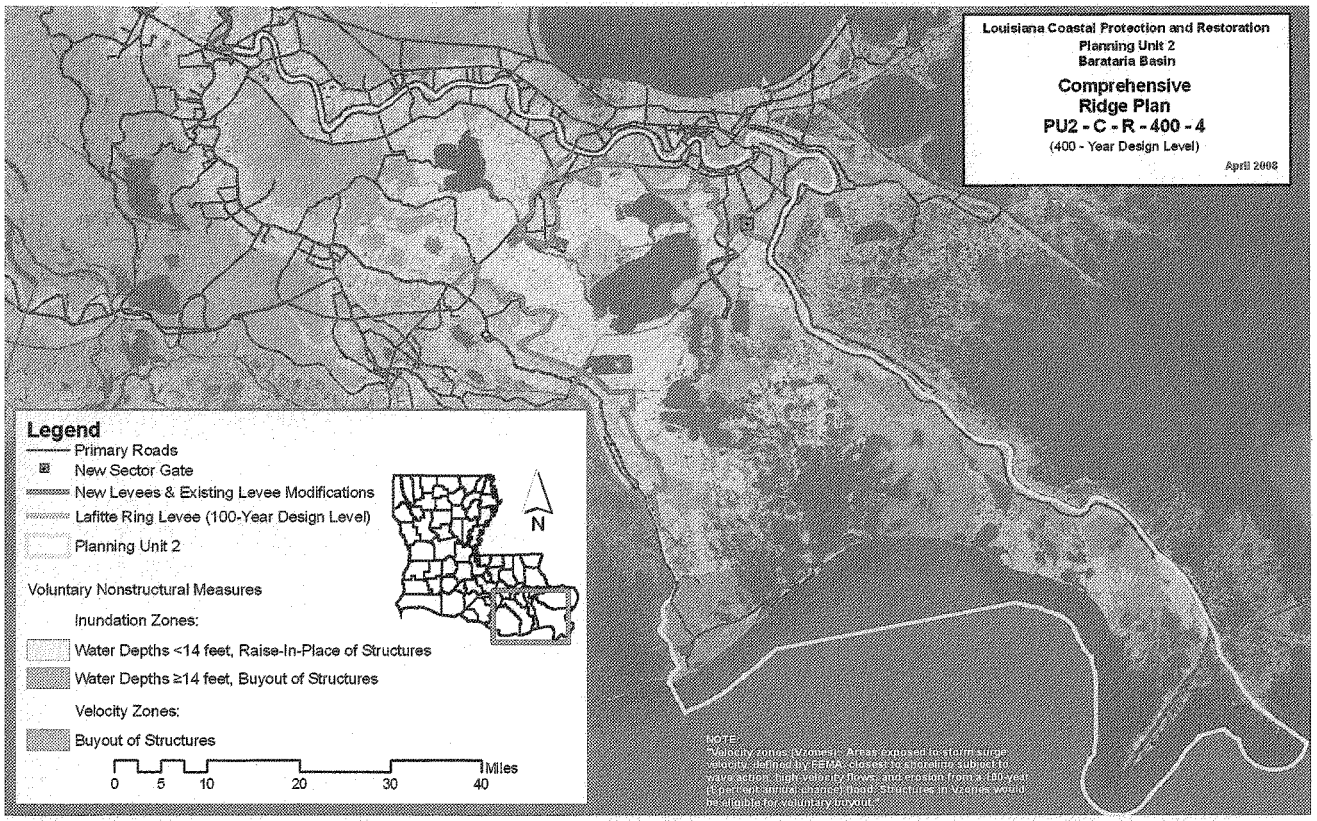
Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	2,523	13,119	228	329	776	61	277	26	9
		Mid		16,002	515	765	2,098	155	224	26	9
		Low		17,014	645	910	2,522	177	171	25	8
2	High RSLR High Employment Dispersed Population	High	2,532	13,943	354	550	1,399	118	277	26	9
		Mid		16,281	560	810	2,171	162	224	25	9
		Low		17,170	689	977	2,634	188	171	23	8
3	Low RSLR Business-as-Usual Compact Population	High	2,573	8,549	208	293	692	52	277	26	9
		Mid		11,085	466	626	1,794	125	224	26	9
		Low		12,058	579	750	2,162	143	171	25	8
4	High RSLR Business-as-Usual Compact Population	High	2,582	9,160	310	454	1,124	92	277	26	9
		Mid		11,235	496	668	1,864	132	224	25	9
		Low		12,125	600	802	2,236	150	171	23	8

Other Results			Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Construction Time (years)		13	After 50 yrs (% of baseline)	103	99	103	99
Direct Wetland Impacts (acres)		5,300	After 100 yrs (% of baseline)	110	104	110	104
Indirect Impacts (unitless)		4	Present Value of Life Cycle Costs ($ Millions)				
Spatial Integrity (unitless)		0.36	Coastal Component	15,657	15,689	15,657	15,689
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)	Nonstructural Component	2,300	2,300	3,272	3,272
	1 / 2	17,844	Structural Component	31,466	31,605	31,466	31,605
	3 / 4	18,184	Total Project	49,423	49,594	50,395	50,566

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 2
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		Comprehensive Plan
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	Ridge Alt
10-year	1,583	218	2,834	347	1,512	175	2,129	212	400-year Design
100-year	46,652	416	49,467	1,296	37,218	354	39,133	599	
400-year	51,671	2,390	53,124	3,576	40,614	1,237	41,659	1,978	
1,000-year	53,208	8,294	54,188	9,130	41,777	5,791	42,556	6,162	
2,000-year	53,965	27,377	54,716	27,999	42,386	22,873	42,963	23,210	

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels.

1863


Louisiana Coastal Protection and Restoration
Planning Unit 2
Barataria Basin
Comprehensive
Ridge Plan
PU2 - C - R - 400 - 4
(400 - Year Design Level)
April 2008
Legend
Primary Roads
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New Levees & Existing Levee Modifications
Lafitte Ring Levee (100-Year Design Level)
Planning Unit 2
Voluntary Nonstructural Measures
Inundation Zones:
Water Depths <14 feet, Raise-In-Place of Structures
Water Depths ≥14 feet, Buyout of Structures
Velocity Zones:
Buyout of Structures
0 5 10 20 30 40 Miles
N
NOTE:
"Velocity zones (Vzones): Areas exposed to storm surge velocity, defined by FEMA, closest to shoreline subject to wave action, high velocity flows, and erosion from a 100-year (1 percent annual chance) flood. Structures in Vzones would be eligible for voluntary buyout."

1864

Planning Unit:	2	Alt. No.:	PU2-C-R-1000-4	Category:	Comprehensive (Coastal+Structural+Nonstructural)
Alternative Description:	Comprehensive plan--Same coastal and structural measures as Alternative PU2-R-1000-4 but with complementary nonstructural measures to reduce residual risk.				
Coastal Component:	R2 (pulsed diversions)		Nonstructural Component:		1000-yr complementary measures
Structural Component:	Same as Alternative PU2-R-1000-4				

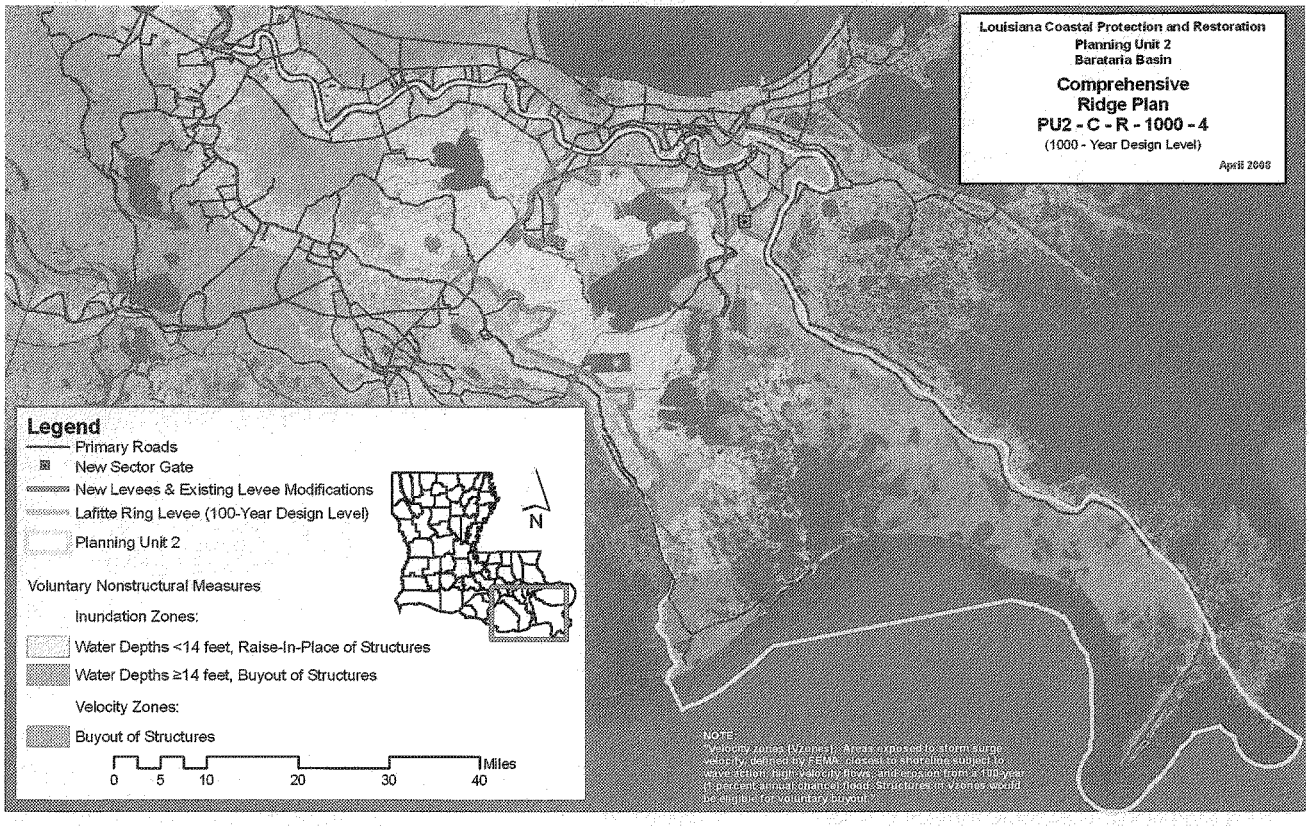
Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	2,943	12,903	225	329	776	61	277	26	9
		Mid		15,761	509	758	2,084	154	224	26	9
		Low		16,628	626	886	2,462	172	171	25	8
2	High RSLR High Employment Dispersed Population	High	2,976	13,727	349	543	1,389	117	277	26	9
		Mid		16,040	551	797	2,152	160	224	26	9
		Low		16,784	660	937	2,548	182	171	23	8
3	Low RSLR Business-as-Usual Compact Population	High	2,975	8,511	205	293	692	52	277	26	9
		Mid		11,021	462	623	1,788	125	224	26	9
		Low		11,856	565	732	2,110	140	171	25	8
4	High RSLR Business-as-Usual Compact Population	High	3,007	9,121	307	450	1,114	92	277	26	9
		Mid		11,172	490	661	1,854	131	224	26	9
		Low		11,922	584	778	2,170	146	171	23	8

Other Results			
Construction Time (years)			13
Direct Wetland Impacts (acres)			6,800
Indirect Impacts (unitless)			4
Spatial Integrity (unitless)			0.36
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)	
	1 / 2	20,758	20,979
	3 / 4	20,975	21,196

Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
After 50 yrs (% of baseline)	103	99	103	99
After 100 yrs (% of baseline)	110	104	110	104
Present Value of Life Cycle Costs ($ Millions)				
Coastal Component	15,657	15,689	15,657	15,689
Nonstructural Component	2,815	2,815	3,436	3,436
Structural Component	39,174	39,774	39,174	39,774
Total Project	57,646	58,277	58,267	58,899

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 2
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		Comprehensive Plan
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	Ridge Alt
10-year	1,583	190	2,834	291	1,512	164	2,129	188	1000-year Design
100-year	46,652	336	49,467	607	37,218	300	39,133	444	
400-year	51,671	666	53,124	1,942	40,614	488	41,659	979	
1,000-year	53,208	2,264	54,188	3,423	41,777	1,254	42,556	1,945	
2,000-year	53,965	4,415	54,716	5,716	42,386	2,978	42,963	3,363	

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price level.


Louisiana Coastal Protection and Restoration
Planning Unit 2
Barataria Basin
Comprehensive
Ridge Plan
PU2 - C - R - 1000 - 4
(1000 - Year Design Level)
April 2008
Legend
Primary Roads
New Sector Gate
New Levees & Existing Levee Modifications
Lafitte Ring Levee (100-Year Design Level)
Planning Unit 2
Voluntary Nonstructural Measures
Inundation Zones:
Water Depths <14 feet, Raise-In-Place of Structures
Water Depths ≥14 feet, Buyout of Structures
Velocity Zones:
Buyout of Structures
N
0 5 10 20 30 40 Miles
NOTE
"Velocity zone (V-zone) - Area exposed to storm surge velocity defined by FEMA - coastal shoreline subject to wave action, high velocity flows, and erosion from a 1%/year (1-percent annual chance) flood. Structures in V-zone would be eligible for voluntary buyout."

1866

Planning Unit:	2	Alt. No.:	PU2-C-G-100-1	Category:	Comprehensive (Coastal+Structural+Nonstructural)
Alternative Description:	Comprehensive plan--Same coastal and structural measures as Alternative PU2-G-100-1 but with complementary nonstructural measures to reduce residual risk.				
Coastal Component:	R2 (pulsed diversions)			Nonstructural Component:	100-yr complementary measures
Structural Component:	Same as Alternative PU2-G-100-1				

Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	1,343	14,977	232	330	747	58	502	26	9
		Mid		17,773	495	751	2,062	148	449	26	9
		Low		19,020	633	984	2,558	176	396	24	8
2	High RSLR High Employment Dispersed Population	High	1,352	15,799	355	638	1,396	116	502	26	9
		Mid		18,099	562	882	2,203	161	449	26	9
		Low		19,250	697	1,044	2,693	188	396	23	8
3	Low RSLR Business-as-Usual Compact Population	High	1,347	10,008	211	294	676	51	502	26	9
		Mid		12,546	449	611	1,778	120	449	26	9
		Low		13,727	569	791	2,201	143	396	24	8
4	High RSLR Business-as-Usual Compact Population	High	1,356	10,671	311	518	1,152	93	502	26	9
		Mid		12,812	496	749	1,943	136	449	26	9
		Low		13,899	608	920	2,388	161	396	23	8

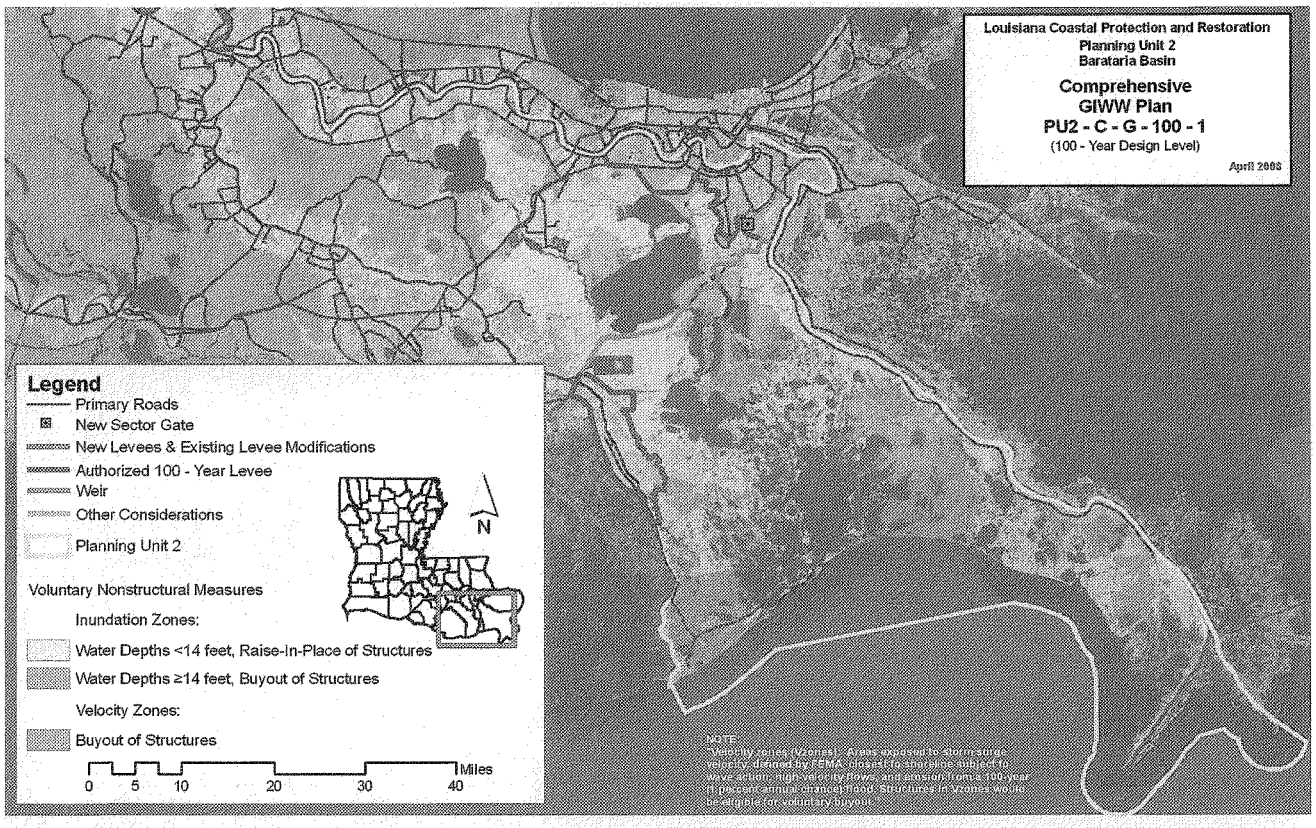
Other Results			
Construction Time (years)			11
Direct Wetland Impacts (acres)			1,000
Indirect Impacts (unitless)			-8
Spatial Integrity (unitless)			0.36
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)	
	1 / 2	9,356	9,417
	3 / 4	9,382	9,443

Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
After 50 yrs (% of baseline)	103	99	103	99
After 100 yrs (% of baseline)	110	104	110	104
Present Value of Life Cycle Costs ($ Millions)				
Coastal Component	15,657	15,689	15,657	15,689
Nonstructural Component	3,053	3,053	3,128	3,128
Structural Component	7,604	7,748	7,604	7,748
Total Project	26,315	26,490	26,389	26,565

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 2
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		Comprehensive Plan
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	
10-year	1,583	702	2,834	1,209	1,512	586	2,129	888	GIWW Alt
100-year	46,652	2,148	49,467	4,027	37,218	1,748	39,133	2,871	
400-year	51,671	6,471	53,124	8,140	40,614	4,781	41,659	5,812	100-year Design
1,000-year	53,208	11,684	54,188	13,014	41,777	8,052	42,556	8,754	
2,000-year	53,965	13,601	54,716	14,559	42,386	9,115	42,963	9,812	

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels.

1867


Louisiana Coastal Protection and Restoration
Planning Unit 2
Barataria Basin
Comprehensive
GIWW Plan
PU2 - C - G - 100 - 1
(100 - Year Design Level)
April 2008
Legend
Primary Roads
New Sector Gate
New Levees & Existing Levee Modifications
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Other Considerations
Planning Unit 2
Voluntary Nonstructural Measures
Inundation Zones:
Water Depths <14 feet, Raise-In-Place of Structures
Water Depths ≥14 feet, Buyout of Structures
Velocity Zones:
Buyout of Structures
N
0 5 10 20 30 40 Miles
NOTE:
"Velocity zones (Vzones): Areas exposed to storm surge velocity, defined by FEMA, closest to shoreline subject to wave action, high velocity flows, and erosion from a 100-year (1 percent annual chance) flood. Structures in Vzones would be eligible for voluntary buyout."

1868

Planning Unit:	2	Alt. No.:	PU2-C-G-100-4	Category:	Comprehensive (Coastal+Structural+Nonstructural)
Alternative Description:	Comprehensive plan--Same coastal and structural measures as Alternative PU2-G-100-4 but with complementary nonstructural measures to reduce residual risk.				
Coastal Component:	R2 (pulsed diversions)		Nonstructural Component:		100-yr complementary measures
Structural Component:	Same as Alternative PU2-G-100-4				

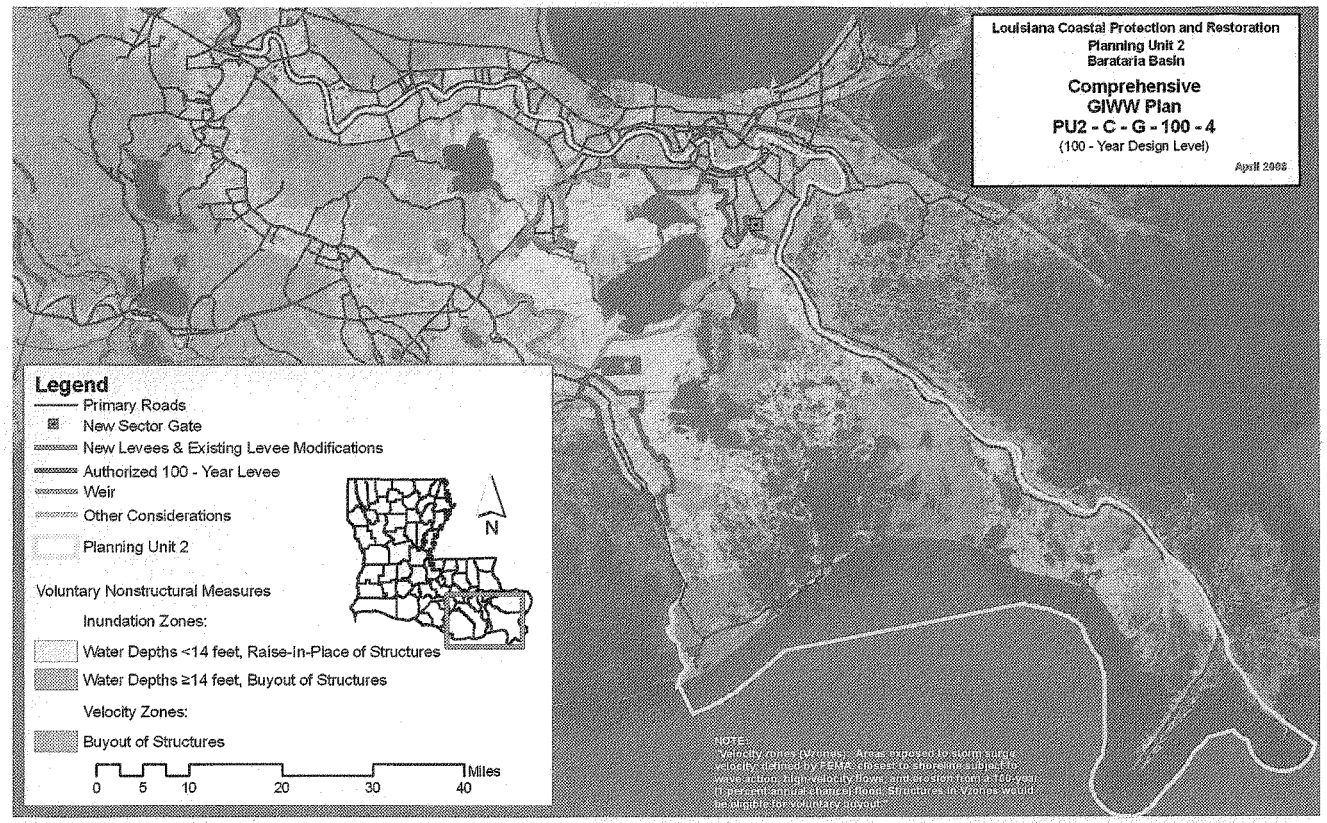
Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	1,671	12,898	218	315	713	54	502	26	9
		Mid		15,549	477	716	1,986	140	449	26	9
		Low		16,755	611	945	2,484	168	396	24	8
2	High RSLR High Employment Dispersed Population	High	1,682	13,607	327	591	1,278	106	502	26	9
		Mid		15,789	528	822	2,059	148	449	26	9
		Low		16,924	658	980	2,543	174	396	23	8
3	Low RSLR Business-as-Usual Compact Population	High	1,673	8,213	198	206	635	46	502	26	9
		Mid		10,604	433	348	1,708	113	449	26	9
		Low		11,692	550	645	2,125	135	396	24	8
4	High RSLR Business-as-Usual Compact Population	High	1,684	8,734	286	471	1,036	84	502	26	9
		Mid		10,750	465	659	1,779	121	449	26	9
		Low		11,794	575	790	2,182	141	396	23	8

Other Results			Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Construction Time (years)		11	After 50 yrs (% of baseline)	103	99	103	99
Direct Wetland Impacts (acres)		2,200	After 100 yrs (% of baseline)	110	104	110	104
Indirect Impacts (unitless)		-8	Present Value of Life Cycle Costs ($ Millions)				
Spatial Integrity (unitless)		0.36	Coastal Component	15,657	15,689	15,657	15,689
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)	Nonstructural Component	2,559	2,559	2,599	2,599
	1 / 2	11,722 11,795	Structural Component	14,521	14,700	14,521	14,700
	3 / 4	11,736 11,809	Total Project	32,737	32,948	32,777	32,988

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 2
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		Comprehensive Plan
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	GIWW Alt
10-year	1,583	336	2,834	611	1,512	220	2,129	303	100-year Design
100-year	46,652	1,396	49,467	2,674	37,218	1,092	39,133	1,672	
400-year	51,671	5,785	53,124	6,754	40,614	4,345	41,659	4,800	
1,000-year	53,208	10,537	54,188	11,352	41,777	7,286	42,556	7,551	
2,000-year	53,965	12,167	54,716	12,656	42,386	8,132	42,963	8,353	

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels.

1869


Louisiana Coastal Protection and Restoration
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Water Depths <14 feet, Raise-In-Place of Structures
Water Depths ≥14 feet, Buyout of Structures
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Buyout of Structures
N
0 5 10 20 30 40 Miles
NOTE:
"Velocity zones (Vzones): Areas exposed to storm surge velocity, defined by FEMA, closest to shoreline subject to wave action, high-velocity flows, and erosion from a 100-year (1 percent annual chance) flood. Structures in Vzones would be eligible for voluntary buyout."

1870

Planning Unit:	2	Alt. No.:	PU2-C-G-400-4	Category:	Comprehensive (Coastal+Structural+Nonstructural)
Alternative Description:	Comprehensive plan--Same coastal and structural measures as Alternative PU2-G-400-4 but with complementary nonstructural measures to reduce residual risk.				
Coastal Component:	R2 (pulsed diversions)		Nonstructural Component:		400-yr complementary measures
Structural Component:	Same as Alternative PU2-G-400-4				

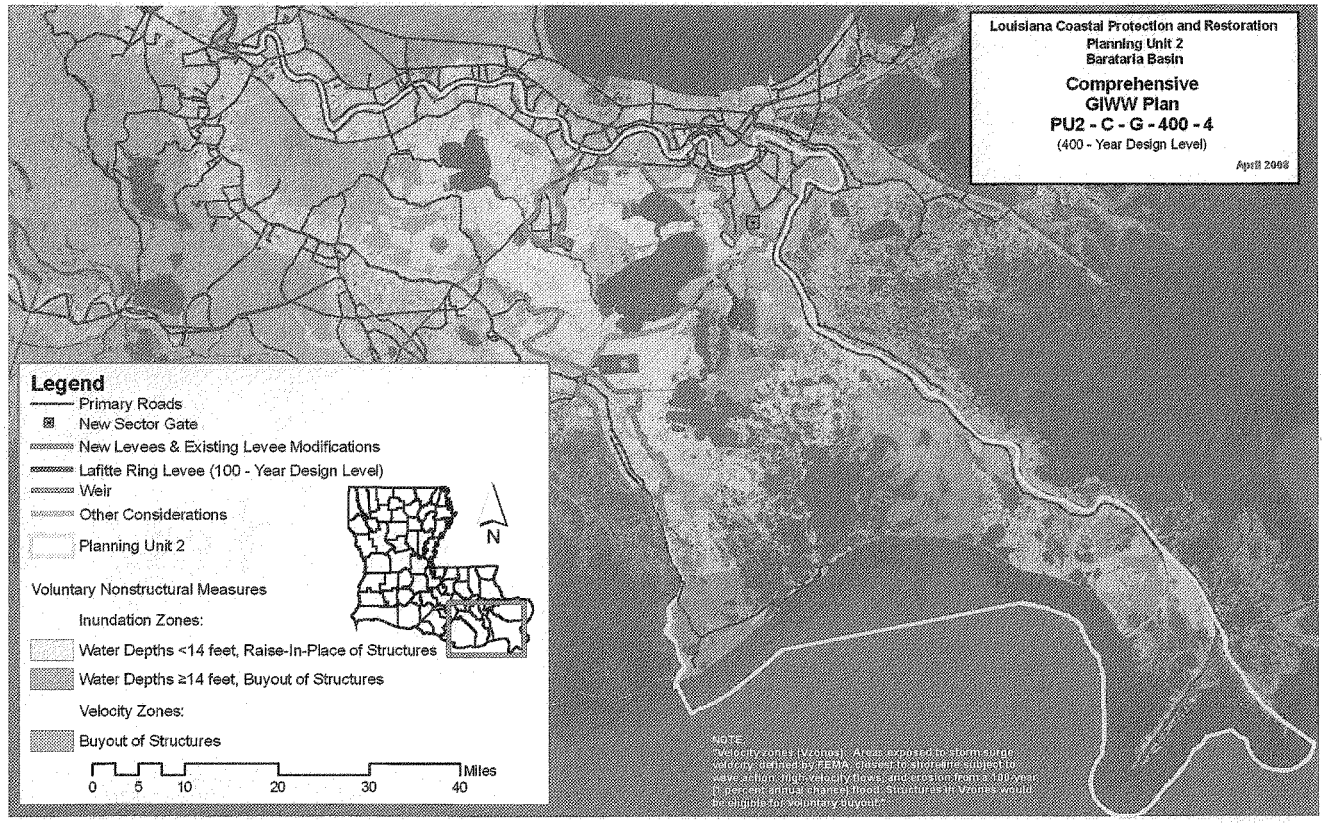
Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	2,691	13,140	234	336	781	61	502	27	9
		Mid		15,847	521	768	2,097	155	449	27	9
		Low		16,772	644	899	2,492	174	396	25	8
2	High RSLR High Employment Dispersed Population	High	2,700	13,960	363	567	1,406	119	502	27	9
		Mid		16,089	571	814	2,176	162	449	27	9
		Low		16,922	687	1,015	2,590	185	396	24	8
3	Low RSLR Business-as-Usual Compact Population	High	2,726	8,471	213	298	690	52	502	27	9
		Mid		10,895	471	633	1,793	125	449	27	9
		Low		11,765	577	742	2,127	141	396	25	8
4	High RSLR Business-as-Usual Compact Population	High	2,735	9,081	317	471	1,140	94	502	27	9
		Mid		11,041	501	679	1,875	133	449	27	9
		Low		11,853	598	835	2,210	150	396	24	8

Other Results			Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Construction Time (years)		13	After 50 yrs (% of baseline)	103	99	103	99
Direct Wetland Impacts (acres)		7,400	After 100 yrs (% of baseline)	110	104	110	104
Indirect Impacts (unitless)		-8	Present Value of Life Cycle Costs ($ Millions)				
Spatial Integrity (unitless)		0.36	Coastal Component	15,657	15,689	15,657	15,689
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)	Nonstructural Component	2,302	2,302	2,988	2,988
	1 / 2	18,964 19,022	Structural Component	34,745	34,880	34,745	34,880
	3 / 4	19,204 19,262	Total Project	52,704	52,871	53,390	53,557

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 2
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		Comprehensive Plan
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	GIWW Alt
10-year	1,583	260	2,834	492	1,512	177	2,129	225	400-year Design
100-year	46,652	522	49,467	1,343	37,218	412	39,133	637	
400-year	51,671	2,201	53,124	3,288	40,614	1,158	41,659	1,764	
1,000-year	53,208	3,927	54,188	4,869	41,777	1,994	42,556	2,366	
2,000-year	53,965	5,011	54,716	5,635	42,386	2,623	42,963	2,966	

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels.

1871


Louisiana Coastal Protection and Restoration
Planning Unit 2
Barataria Basin
Comprehensive
GIWW Plan
PU2 - C - G - 400 - 4
(400 - Year Design Level)
April 2008
Legend
Primary Roads
New Sector Gate
New Levees & Existing Levee Modifications
Lafitte Ring Levee (100 - Year Design Level)
Weir
Other Considerations
Planning Unit 2
Voluntary Nonstructural Measures
Inundation Zones:
Water Depths <14 feet, Raise-In-Place of Structures
Water Depths ≥14 feet, Buyout of Structures
Velocity Zones:
Buyout of Structures
N
0 5 10 20 30 40
Miles
NOTE:
Velocity zones (V-zones) - Areas exposed to storm surge velocity defined by FEMA caused by shoreline subject to wave action, high velocity flows, and erosion from a 100-year (1 percent annual chance) flood. Structures in V-zones would be eligible for voluntary buyouts.

1872

Planning Unit:	2	Alt. No.:	PU2-C-G-1000-4	Category:	Comprehensive (Coastal+Structural+Nonstructural)
Alternative Description:	Comprehensive plan--Same coastal and structural measures as Alternative PU2-G-1000-4 but with complementary nonstructural measures to reduce residual risk.				
Coastal Component:	R2 (pulsed diversions)		Nonstructural Component:		1000-yr complementary measures
Structural Component:	Same as Alternative PU2-G-1000-4				

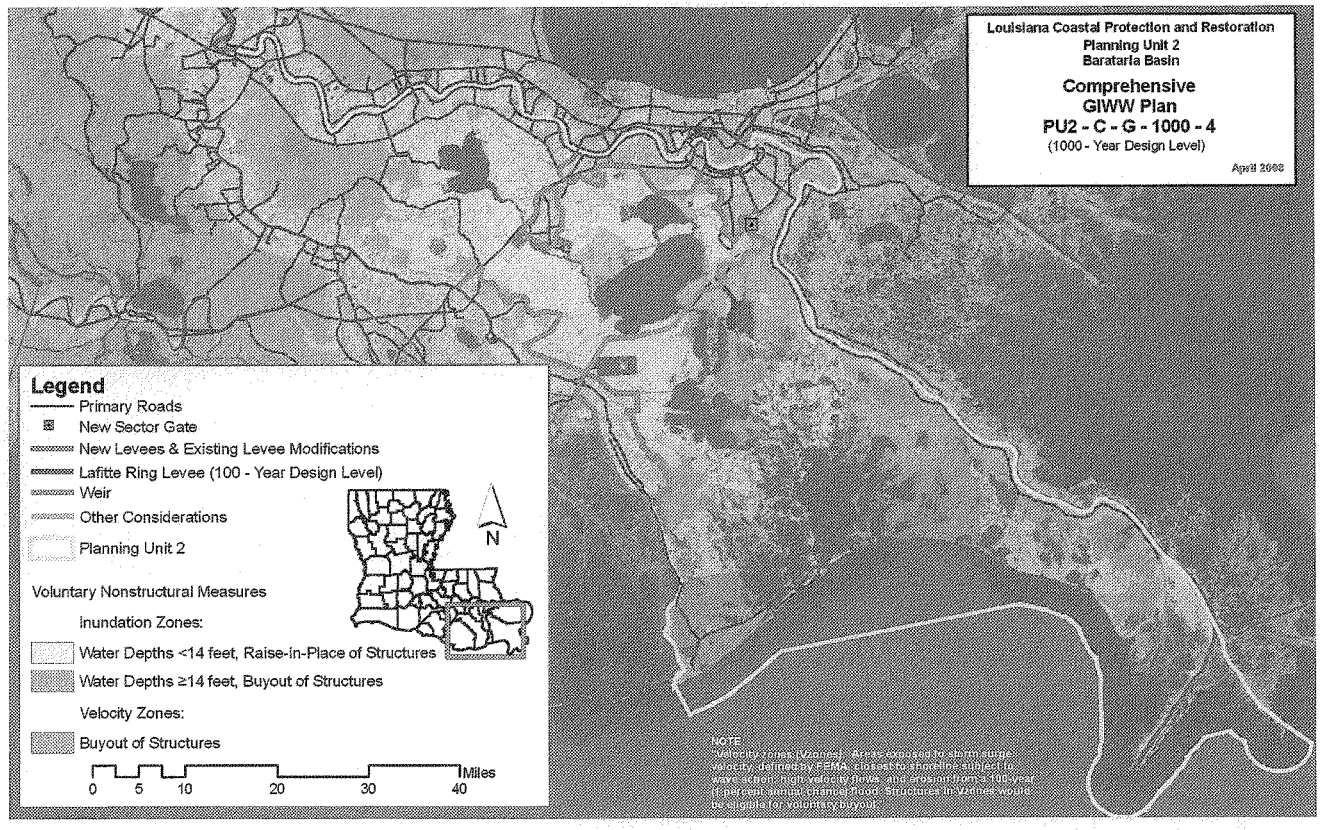
Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	3,113	12,782	228	335	780	61	502	27	9
		Mid		15,367	512	759	2,088	154	449	27	9
		Low		16,250	630	889	2,465	172	396	25	8
2	High RSLR High Employment Dispersed Population	High	3,121	13,584	355	553	1,393	117	502	27	9
		Mid		15,593	557	805	2,152	160	449	27	9
		Low		16,383	665	934	2,542	181	396	24	8
3	Low RSLR Business-as-Usual Compact Population	High	3,139	8,165	208	297	689	52	502	27	9
		Mid		10,440	465	626	1,787	125	449	27	9
		Low		11,274	568	736	2,110	139	396	25	8
4	High RSLR Business-as-Usual Compact Population	High	3,147	8,760	311	463	1,128	93	502	27	9
		Mid		10,573	493	675	1,860	132	449	27	9
		Low		11,349	586	784	2,178	147	396	24	8

Other Results			Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Construction Time (years)		13	After 50 yrs (% of baseline)	103	99	103	99
Direct Wetland Impacts (acres)		9,500	After 100 yrs (% of baseline)	110	104	110	104
Indirect Impacts (unitless)		-8	Present Value of Life Cycle Costs ($ Millions)				
Spatial Integrity (unitless)		0.36	Coastal Component	15,657	15,689	15,657	15,689
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)	Nonstructural Component	2,981	2,981	3,492	3,492
	1 / 2	21,694 21,748	Structural Component	42,335	42,457	42,335	42,457
	3 / 4	21,872 21,926	Total Project	60,973	61,127	61,483	61,638

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 2
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	Comprehensive Plan
10-year	1,583	185	2,834	326	1,512	157	2,129	183	GIWW Alt
100-year	46,652	323	49,467	652	37,218	280	39,133	393	
400-year	51,671	651	53,124	1,781	40,614	395	41,659	804	1000-year Design
1,000-year	53,208	1,926	54,188	2,856	41,777	782	42,556	1,297	
2,000-year	53,965	3,063	54,716	3,996	42,386	1,169	42,963	1,592	

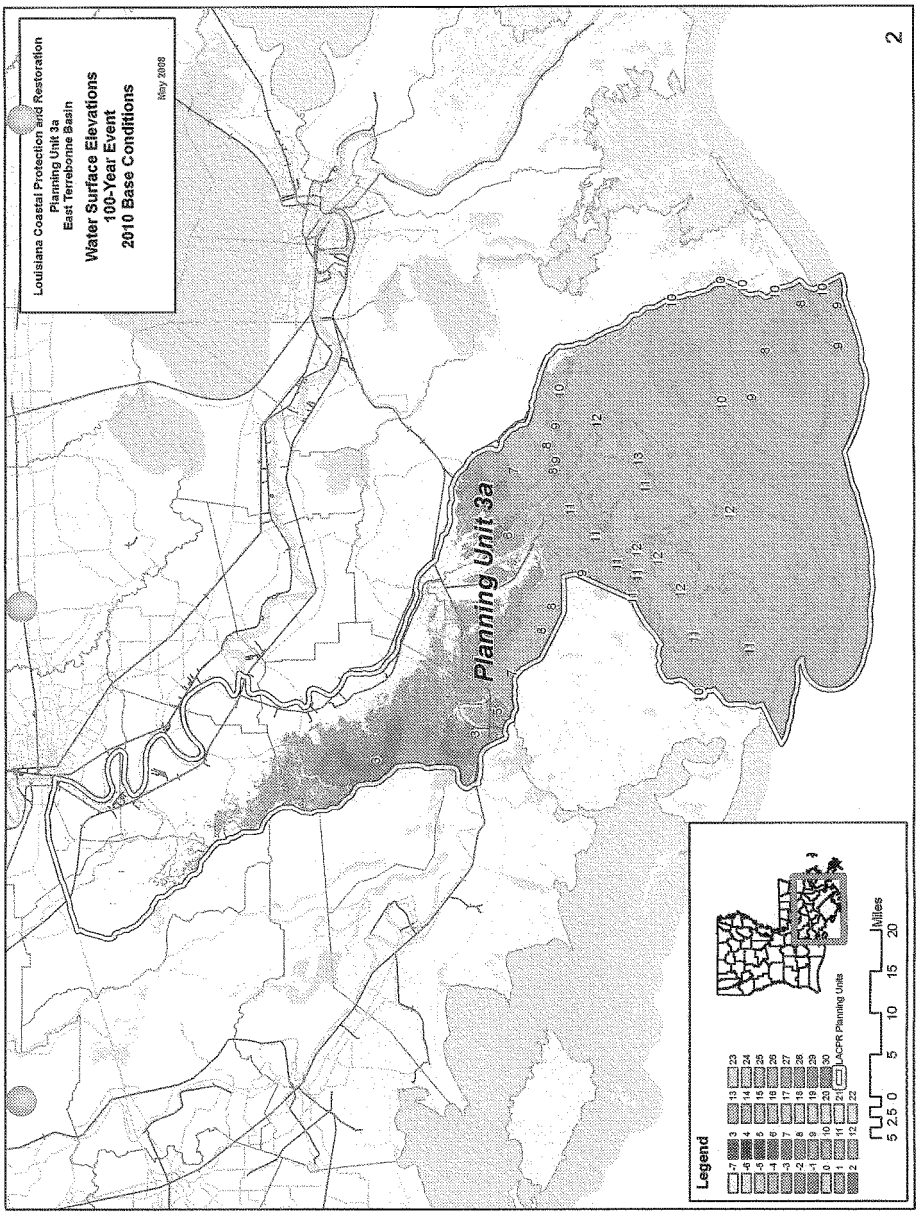
Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price level.

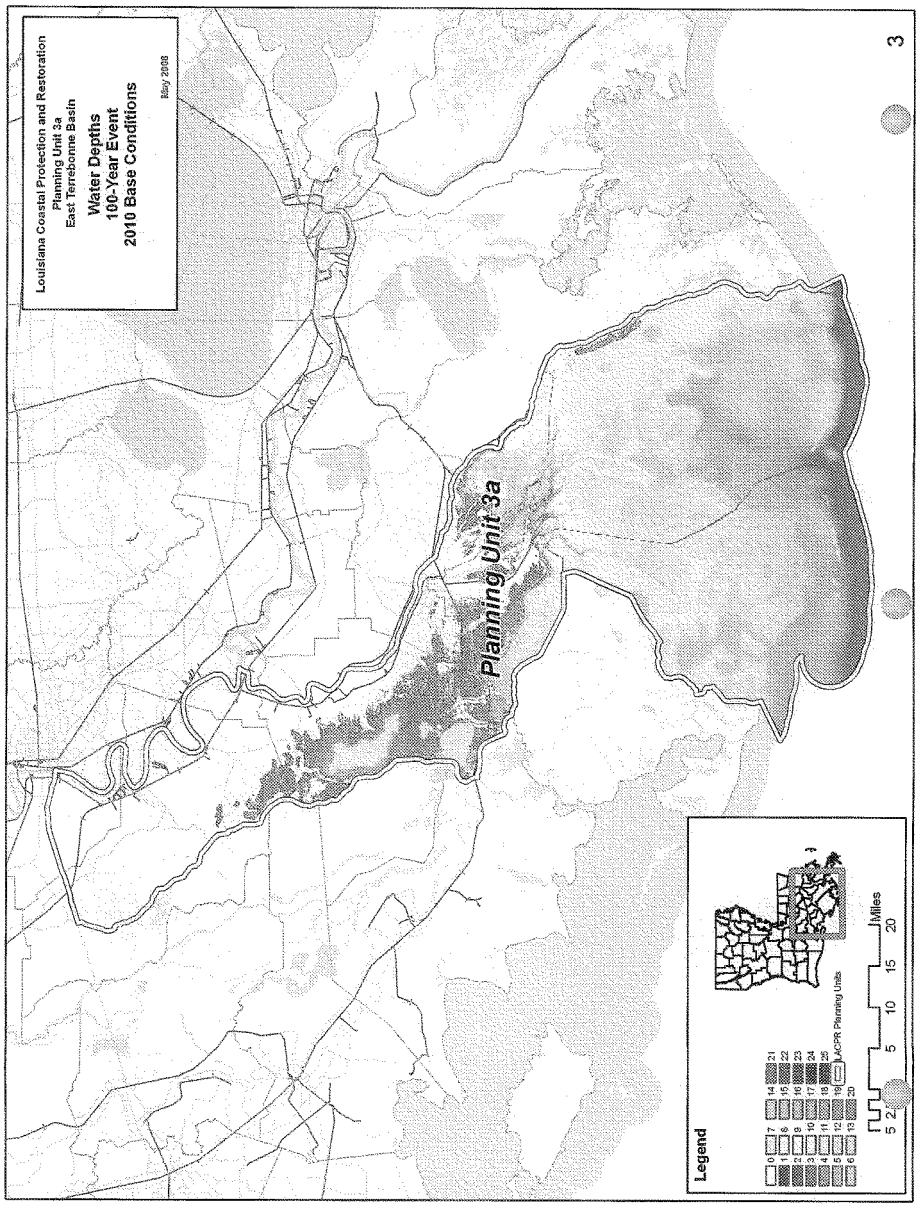
1873

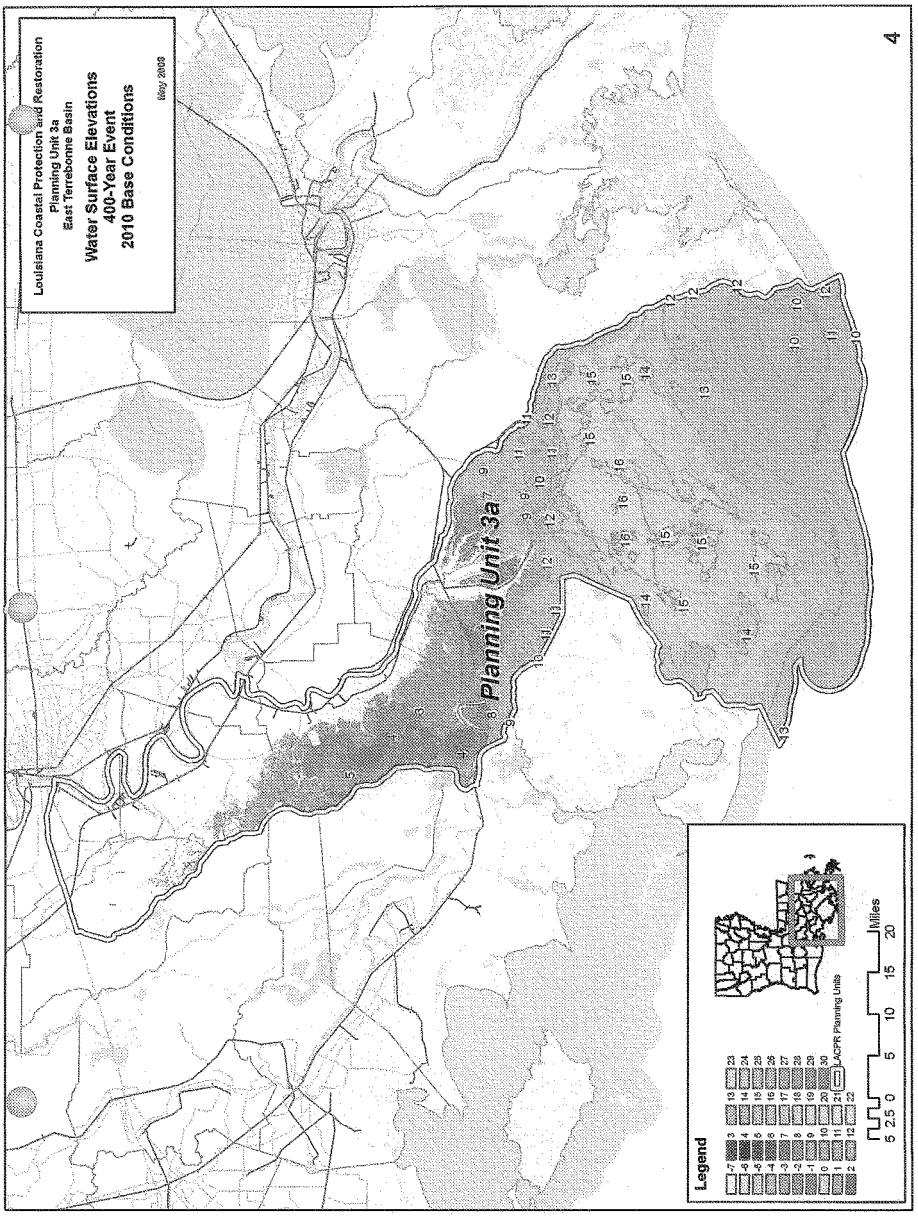

Louisiana Coastal Protection and Restoration
Planning Unit 2
Barataria Basin
Comprehensive
GIWW Plan
PU2 - C - G - 1000 - 4
(1000 - Year Design Level)
April 2008
Legend
Primary Roads
New Sector Gate
New Levees & Existing Levee Modifications
Lafitte Ring Levee (100 - Year Design Level)
Weir
Other Considerations
Planning Unit 2
Voluntary Nonstructural Measures
Inundation Zones:
Water Depths <14 feet, Raise-in-Place of Structures
Water Depths ≥14 feet, Buyout of Structures
Velocity Zones:
Buyout of Structures
N
0 5 10 20 30 40 Miles
NOTE:
"Velocity zones (Vzones): Areas exposed to storm surge velocity, defined by FEMA, closest to shoreline subject to wave action, high velocity flows, and erosion from a 100-year (1 percent annual chance) flood. Structures in Vzones would be eligible for voluntary buyout."

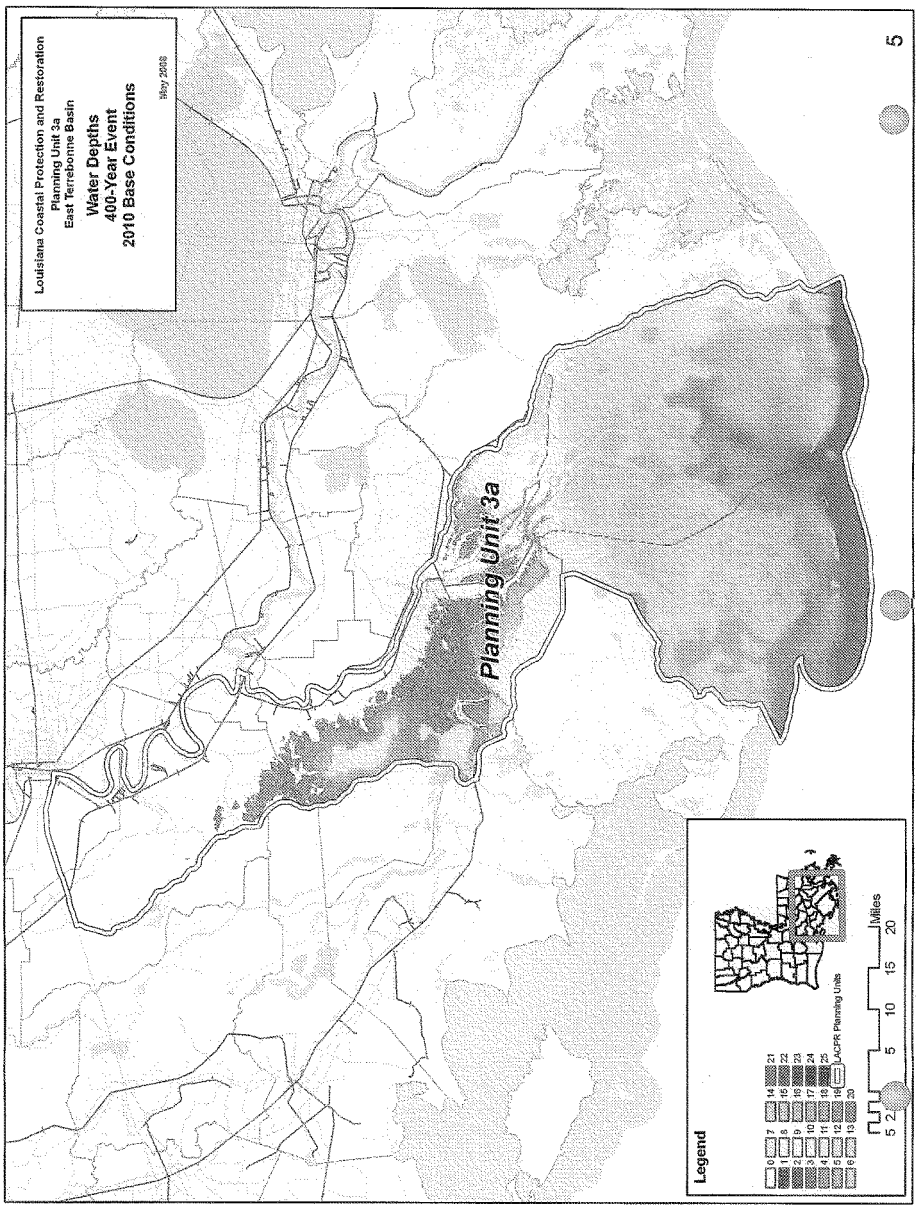
1874

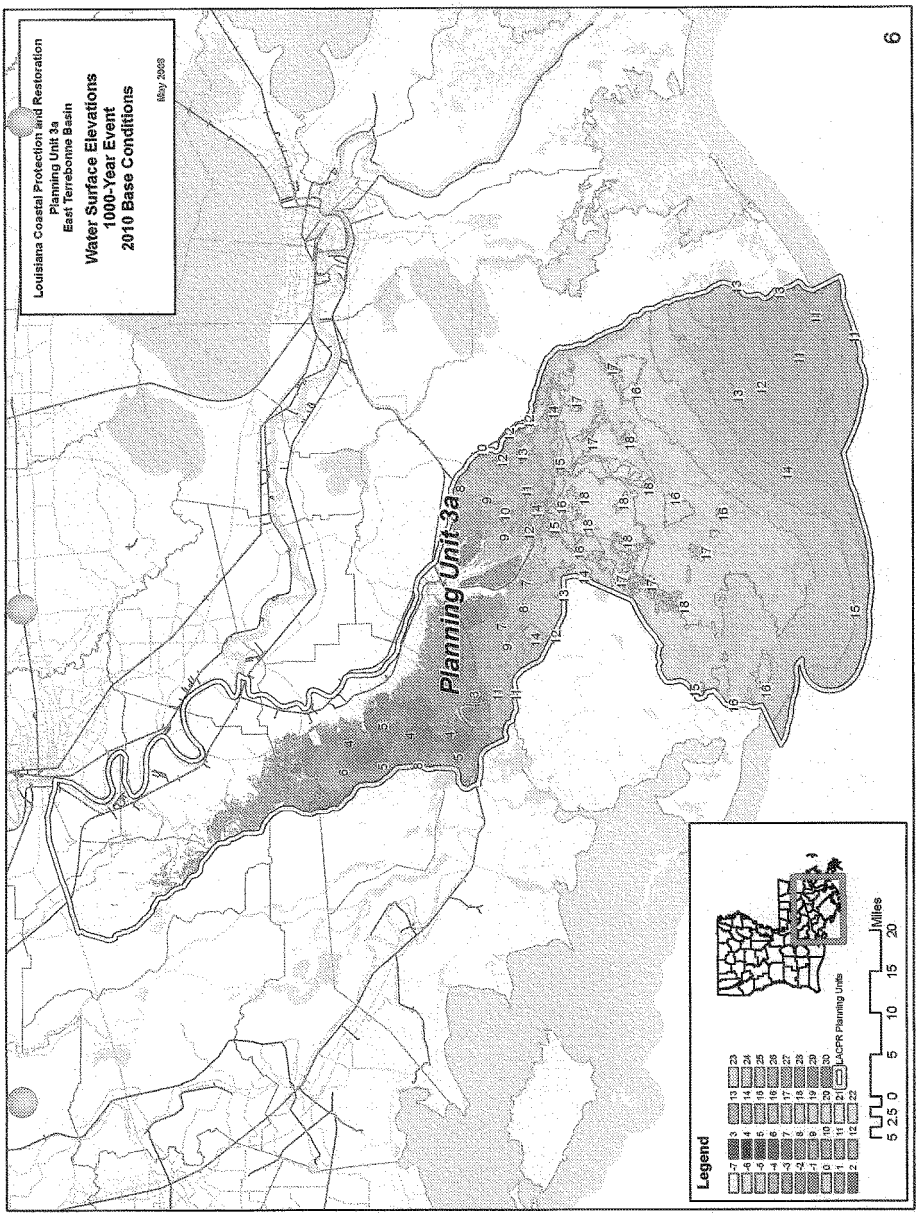
Planning Unit 3a

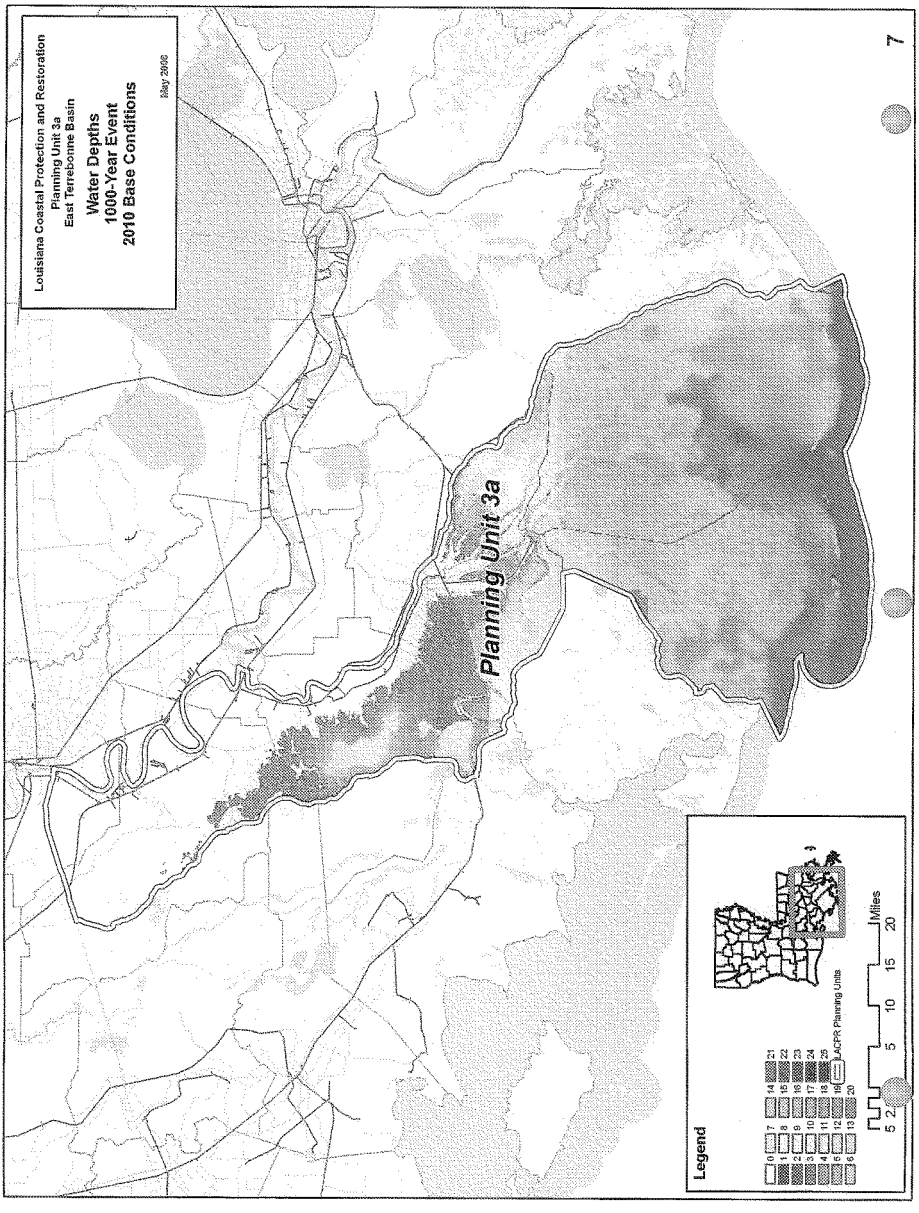

Louisiana Coastal Protection and Restoration
Planning Unit 3a
East Terrebonne Basin
Water Surface Elevations
100-Year Event
2010 Base Conditions
May 2008
Planning Unit 3a
Legend
LACPR Planning Units
Miles
5 2.5 0 5 10 15 20
2

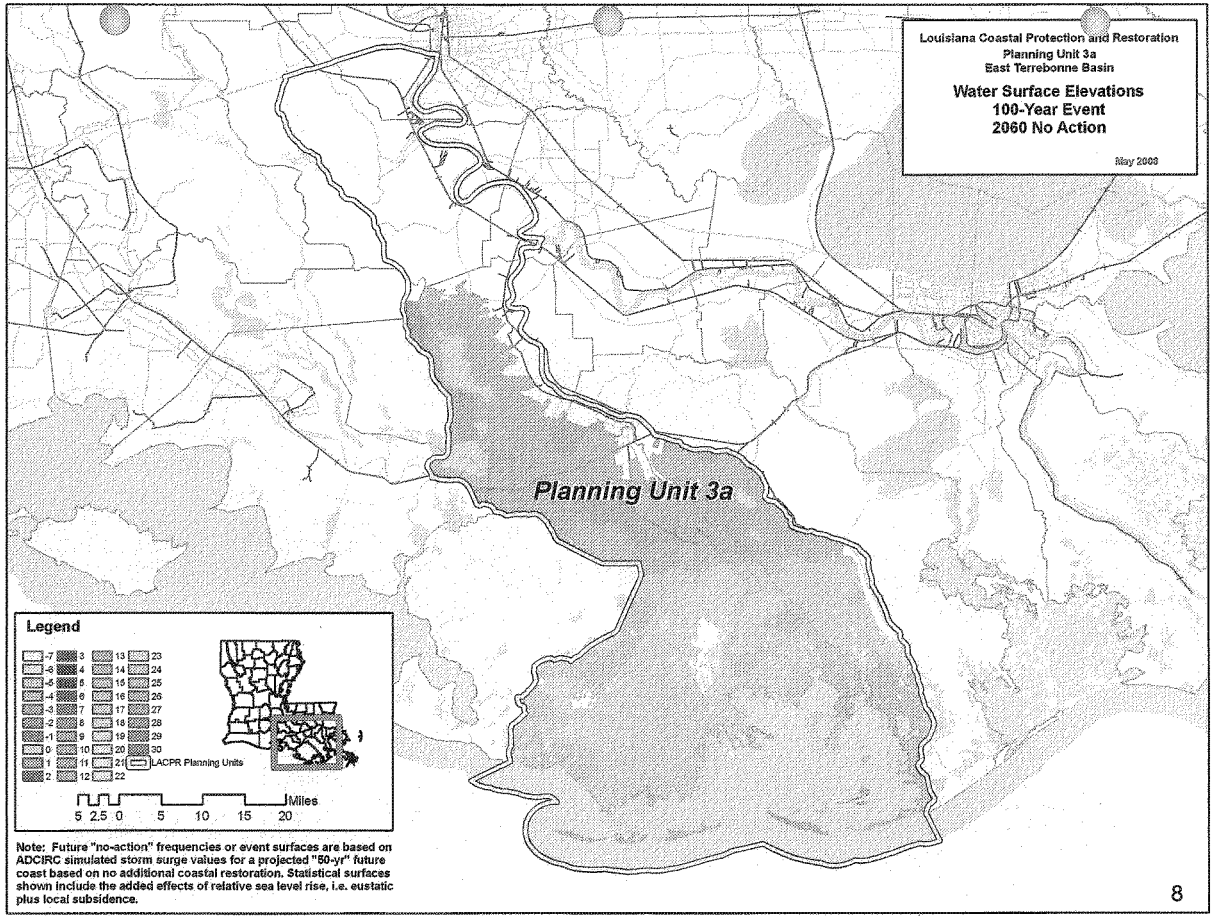

Louisiana Coastal Protection and Restoration
Planning Unit 3a
East Terrebonne Basin
Water Depths
100-Year Event
2010 Base Conditions
May 2008
Planning Unit 3a
Legend
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
LACPR Planning Units
5 2 5 10 15 20
Miles
3

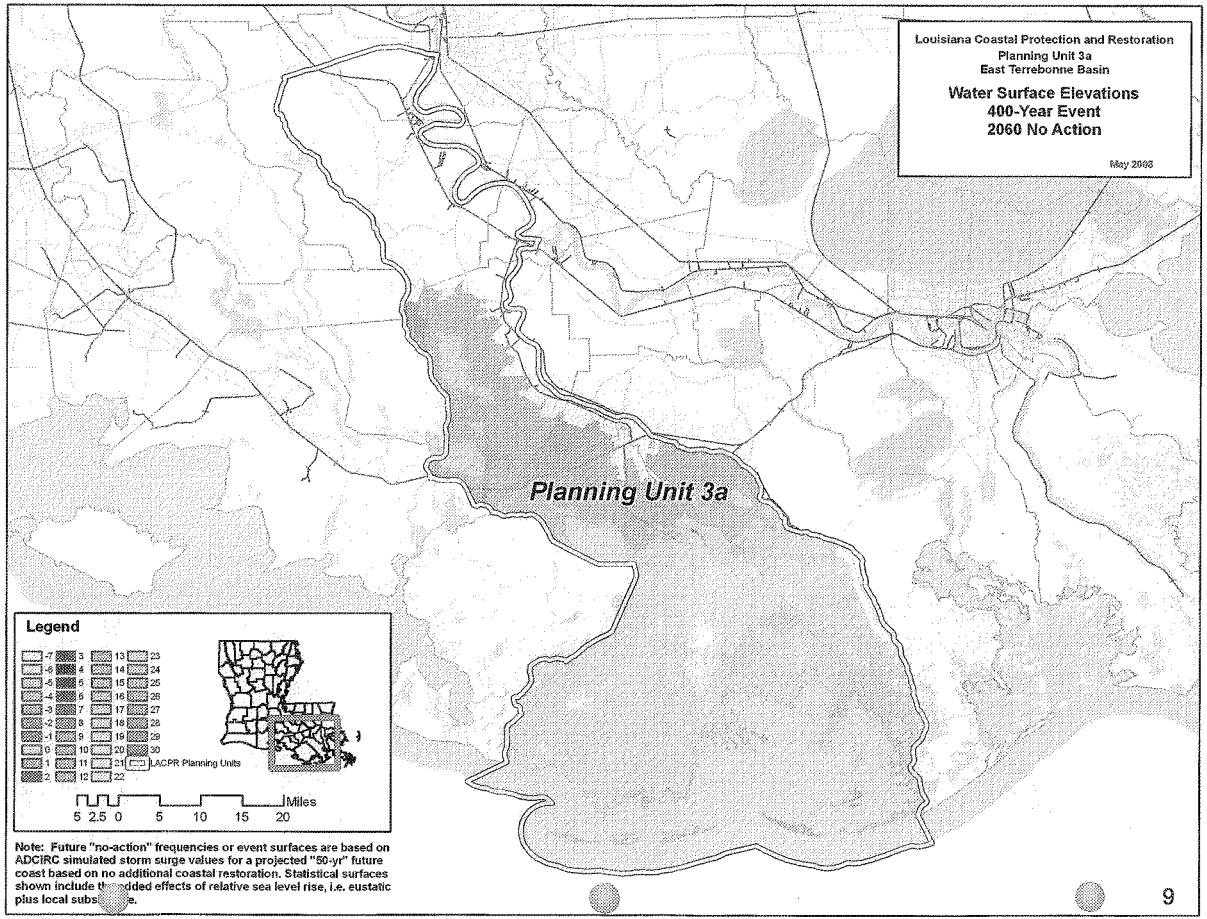

Louisiana Coastal Protection and Restoration
Planning Unit 3a
East Terrebonne Basin
Water Surface Elevations
400-Year Event
2010 Base Conditions
May 2008
Planning Unit 3a
Legend
LACPR Planning Units
Miles
5 2.5 0 5 10 15 20
4

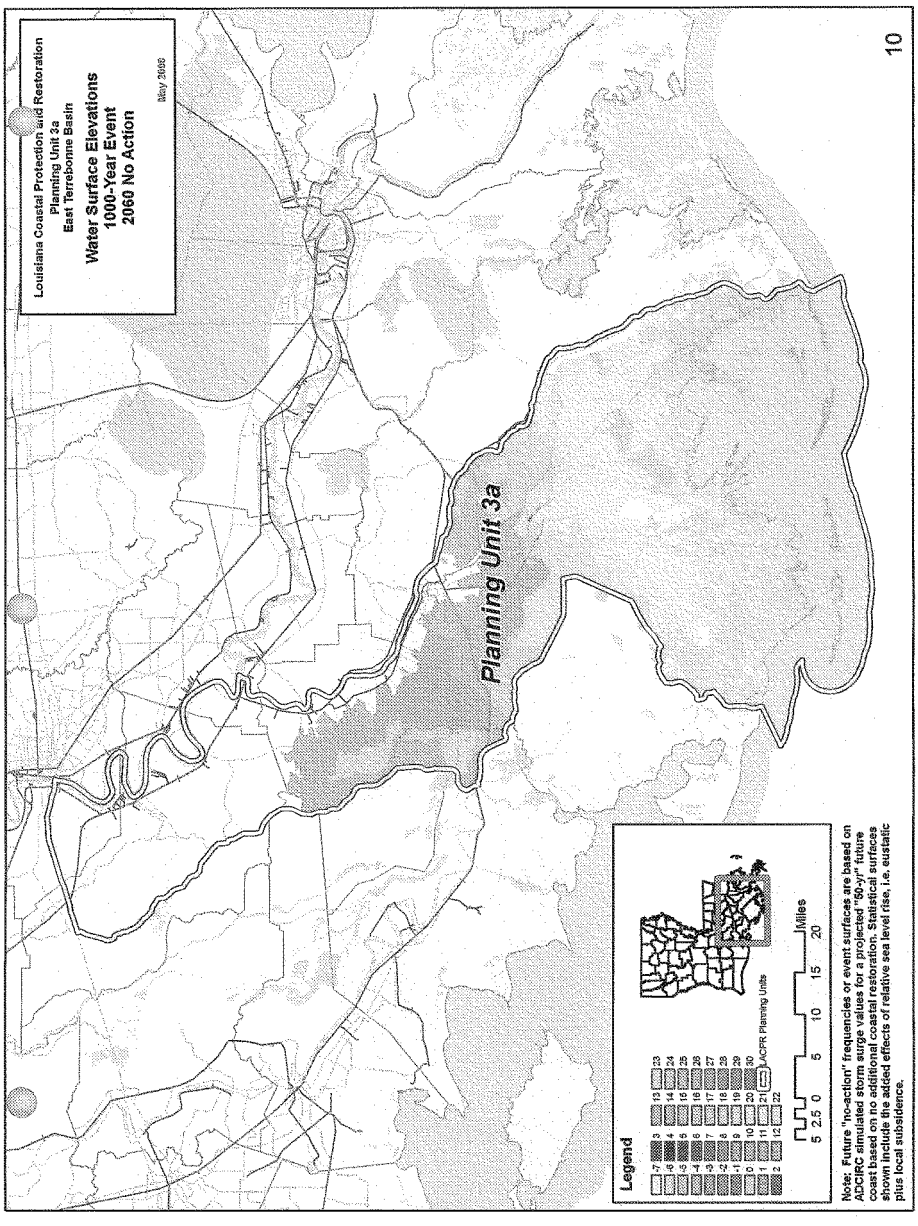

Louisiana Coastal Protection and Restoration
Planning Unit 3a
East Terrebonne Basin
Water Depths
400-Year Event
2010 Base Conditions
May 2008
Planning Unit 3a
Legend
LACPR Planning Units
Miles
5 2 5 10 15 20
5

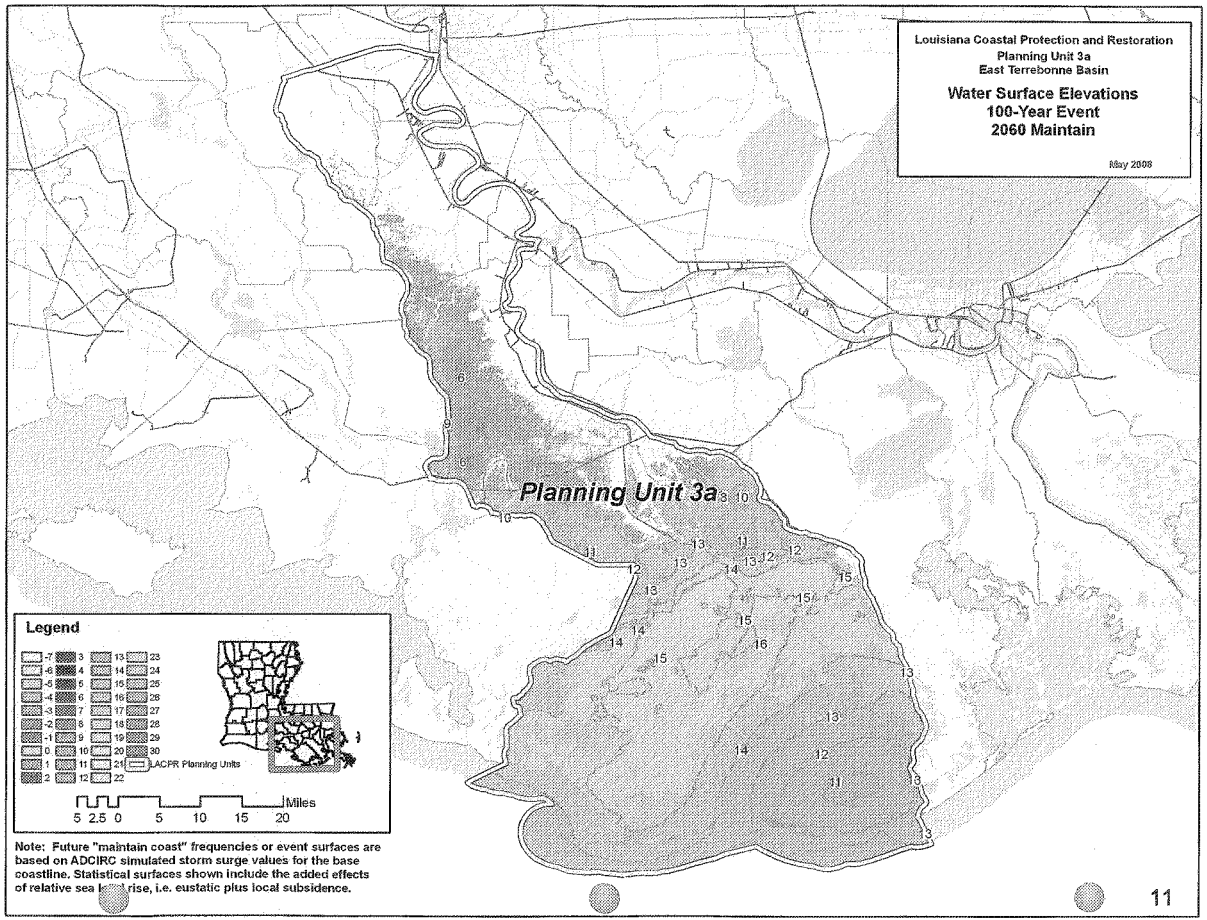

Louisiana Coastal Protection and Restoration
Planning Unit 3a
East Terrebonne Basin
Water Surface Elevations
1000-Year Event
2010 Base Conditions
May 2008
Planning Unit 3a
Legend
LACPR Planning Units
Miles
5 2.5 0 5 10 15 20
6


Louisiana Coastal Protection and Restoration
Planning Unit 3a
East Terrebonne Basin
Water Depths
1000-Year Event
2010 Base Conditions
May 2009
Planning Unit 3a
Legend
LACPR Planning Units
Miles
5 2 5 10 15 20
7

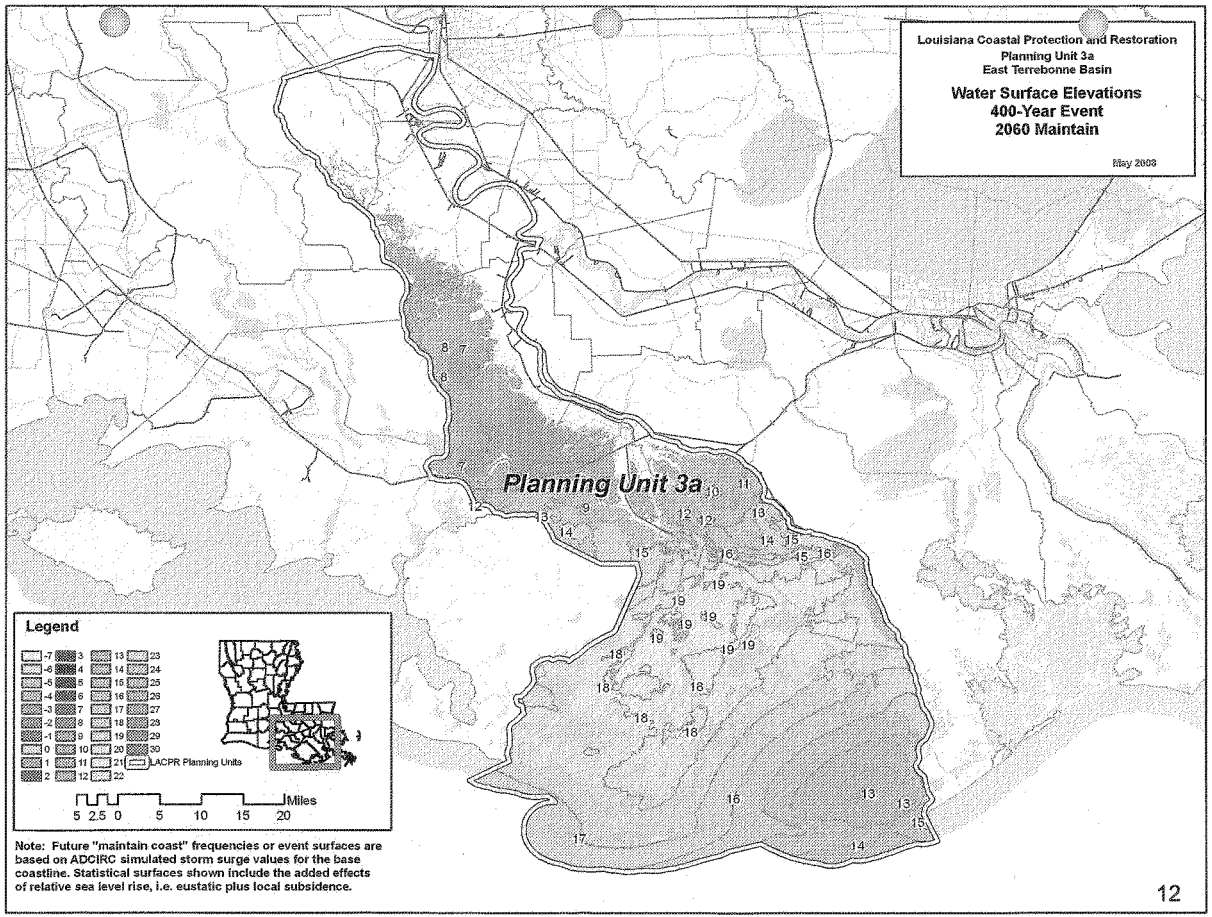

Louisiana Coastal Protection and Restoration
Planning Unit 3a
East Terrebonne Basin
Water Surface Elevations
100-Year Event
2060 No Action
May 2008
Planning Unit 3a
Legend
-7 -6 -5 -4 -3 -2 -1 0 1 2
3 4 5 6 7 8 9 10 11 12
13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
LACPR Planning Units
Miles
5 2.5 0 5 10 15 20
Note: Future "no-action" frequencies or event surfaces are based on ADCIRC simulated storm surge values for a projected "50-yr" future coast based on no additional coastal restoration. Statistical surfaces shown include the added effects of relative sea level rise, i.e. eustatic plus local subsidence.
8

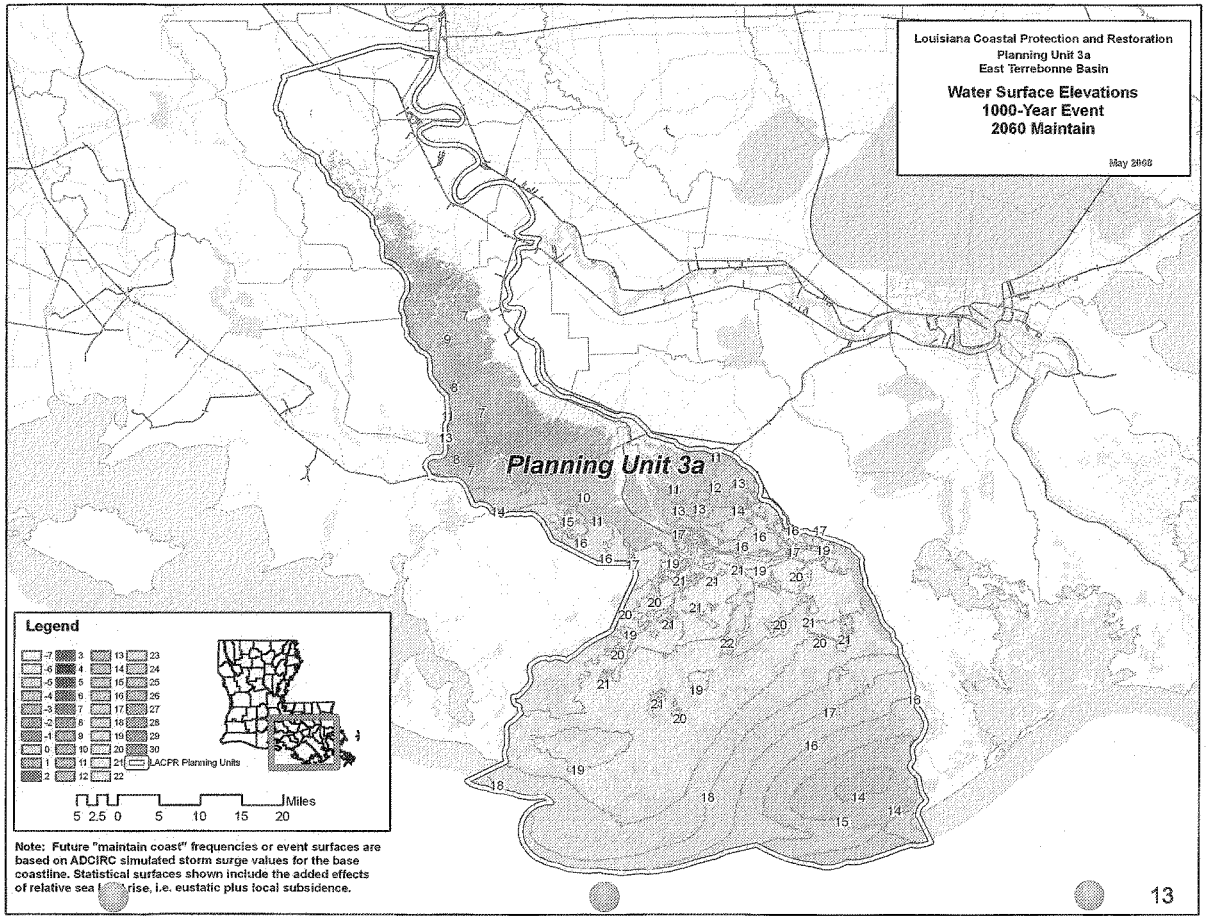

Louisiana Coastal Protection and Restoration
Planning Unit 3a
East Terrebonne Basin
Water Surface Elevations
400-Year Event
2060 No Action
May 2008
Planning Unit 3a
Legend
LACPR Planning Units
Miles
5 2.5 0 5 10 15 20
Note: Future "no-action" frequencies or event surfaces are based on ADCIRC simulated storm surge values for a projected "50-yr" future coast based on no additional coastal restoration. Statistical surfaces shown include the added effects of relative sea level rise, i.e. eustatic plus local subsidence.


Louisiana Coastal Protection and Restoration
Planning Unit 3a
East Terrebonne Basin
Water Surface Elevations
1000-Year Event
2060 No Action
May 2009
Planning Unit 3a
Legend
LACPR Planning Units
Miles
5 2.5 0 5 10 15 20
Note: Future "no-action" frequencies or event surfaces are based on ADCIRC simulated storm surge values for a projected "50-yr" future coast based on no additional coastal restoration. Statistical surfaces shown include the added effects of relative sea level rise, i.e. eustatic plus local subsidence.
10


Louisiana Coastal Protection and Restoration
Planning Unit 3a
East Terrebonne Basin
Water Surface Elevations
100-Year Event
2060 Maintain
May 2008
Planning Unit 3a
Legend
LACPR Planning Units
Miles
5 2.5 0 5 10 15 20
Note: Future "maintain coast" frequencies or event surfaces are based on ADCIRC simulated storm surge values for the base coastline. Statistical surfaces shown include the added effects of relative sea level rise, i.e. eustatic plus local subsidence.

1885


Louisiana Coastal Protection and Restoration
Planning Unit 3a
East Terrebonne Basin
Water Surface Elevations
400-Year Event
2060 Maintain
May 2008
Planning Unit 3a
Legend
LACPR Planning Units
Miles
5 2.5 0 5 10 15 20
Note: Future "maintain coast" frequencies or event surfaces are based on ADCIRC simulated storm surge values for the base coastline. Statistical surfaces shown include the added effects of relative sea level rise, i.e. eustatic plus local subsidence.
12


Louisiana Coastal Protection and Restoration
Planning Unit 3a
East Terrebonne Basin
Water Surface Elevations
1000-Year Event
2060 Maintain
May 2008
Planning Unit 3a
Legend
LACPR Planning Units
Miles
5 2.5 0 5 10 15 20
Note: Future "maintain coast" frequencies or event surfaces are based on ADCIRC simulated storm surge values for the base coastline. Statistical surfaces shown include the added effects of relative sea level rise, i.e. eustatic plus local subsidence.

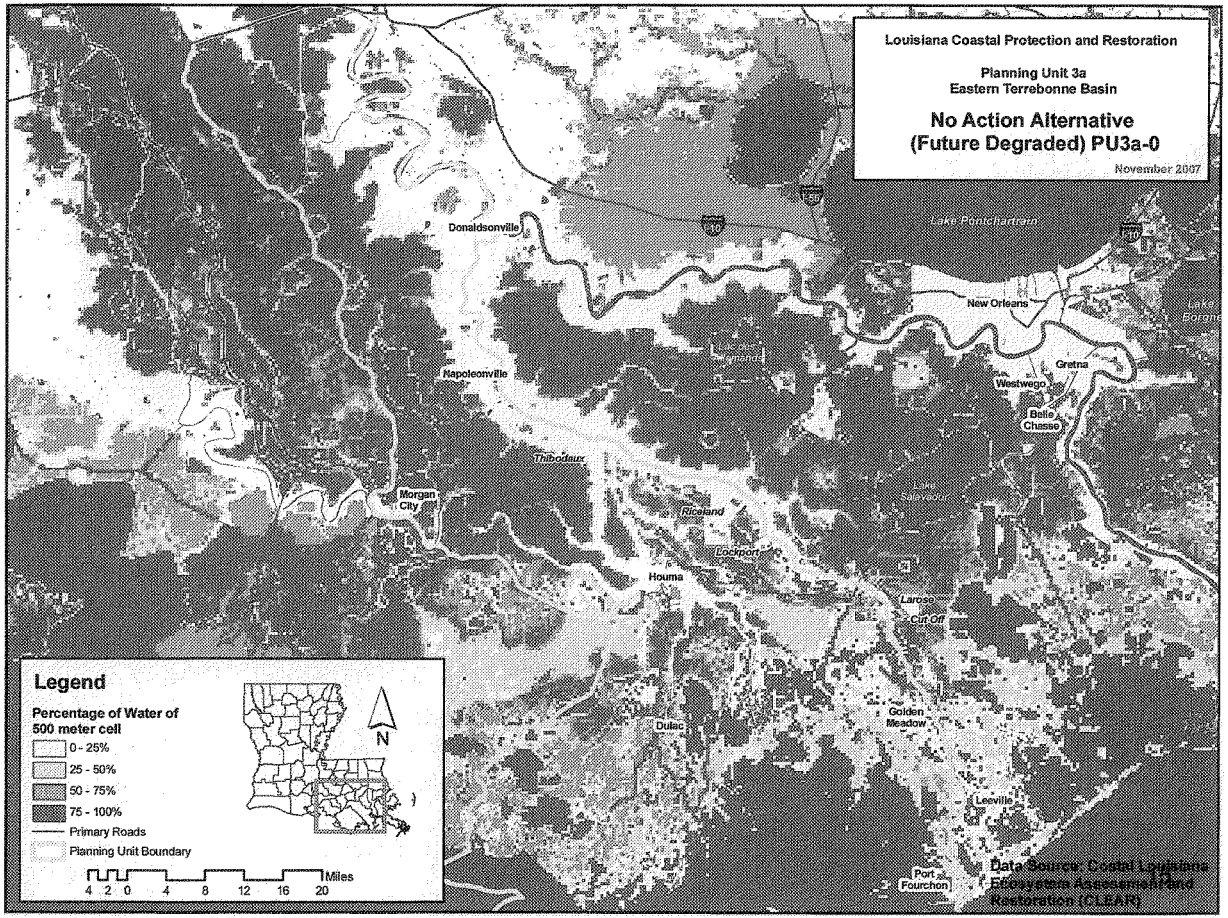
Planning Unit:	3a	Alt. No.:	[illegible]-0	Category:	No Action
Alternative Description:	No action (without project) alternative.				
Coastal Component:	Degraded coast--increasing risk.		Nonstructural Component:		None
Structural Component:	No new levees or increases in risk reduction level for existing levees.				

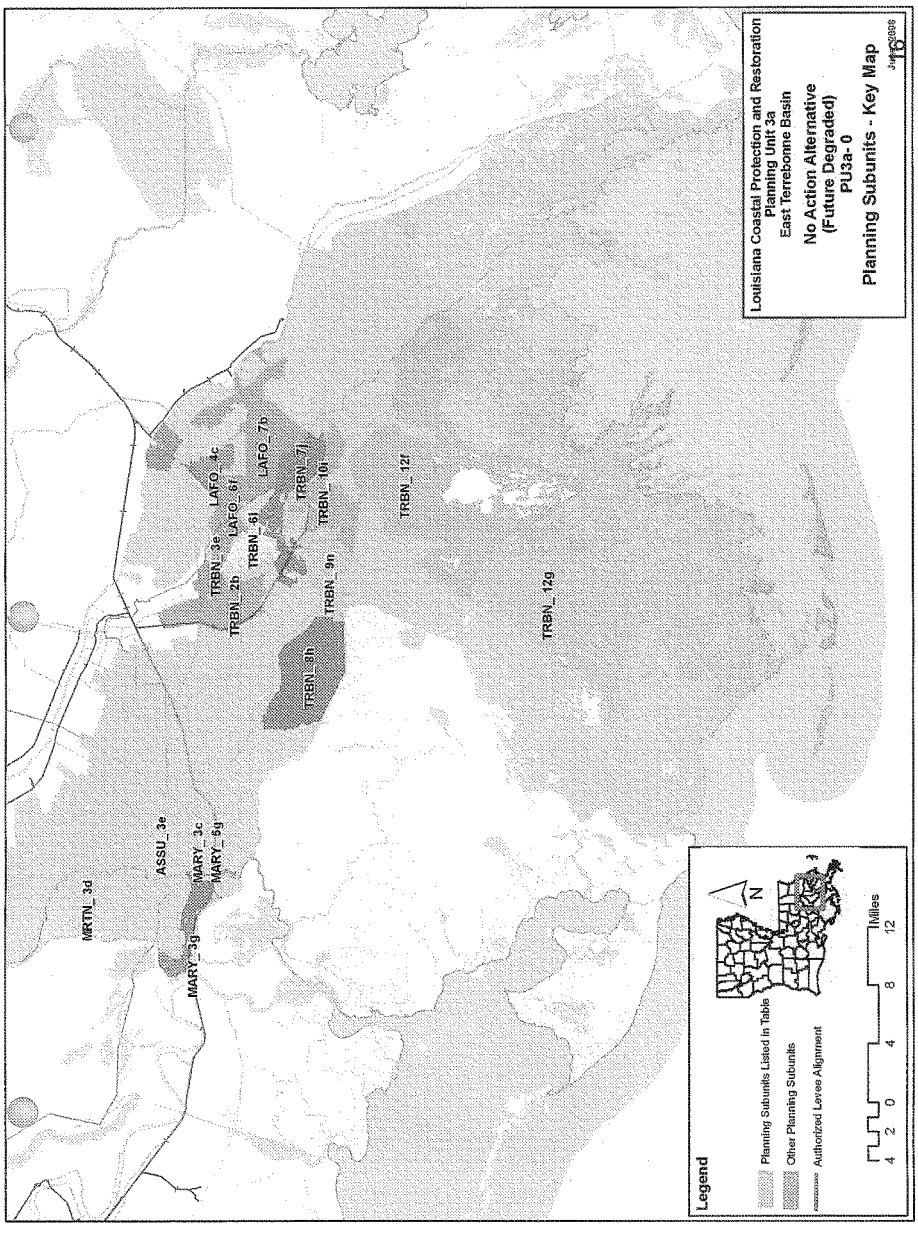
Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands							
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	0	12,448	491	869	2,329	168	92	7	1
		Mid		16,540	752	1,361	3,941	269	82	4	0
		Low		19,069	1,028	1,800	5,462	367	72	0	0
2	High RSLR High Employment Dispersed Population	High	0	14,323	596	1,131	2,872	223	92	5	1
		Mid		18,121	911	1,828	4,951	367	82	3	0
		Low		20,475	1,220	2,088	6,018	423	72	0	0
3	Low RSLR Business-as-Usual Compact Population	High	0	10,774	477	844	2,259	161	92	7	1
		Mid		14,918	723	1,271	3,809	257	82	4	0
		Low		17,236	967	1,634	5,167	341	72	0	0
4	High RSLR Business-as-Usual Compact Population	High	0	12,164	570	854	2,854	221	92	5	1
		Mid		16,092	855	1,197	4,715	345	82	3	0
		Low		18,171	1,115	1,343	5,787	405	72	0	0

Other Results			Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Construction Time (years)		0	After 50 yrs (% of baseline)	68	66	68	66
Direct Wetland Impacts (acres)		0	After 100 yrs (% of baseline)	55	50	55	50
Indirect Impacts (unitless)		0	Present Value of Life Cycle Costs ($ Millions)				
Spatial Integrity (unitless)		0.24	Coastal Component	0	0	0	0
Non-Federal Share of Present Value of Life Cycle Costs	Scenario ($ Millions)		Nonstructural Component	0	0	0	0
	1 / 2	0	Structural Component	0	0	0	0
	3 / 4	0	Total Project	0	0	0	0

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 3a
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	
10-year	1,460	N/A	2,472	N/A	1,422	N/A	2,425	N/A	No Action Plan
100-year	10,629	N/A	15,966	N/A	9,695	N/A	13,659	N/A	
400-year	22,650	N/A	25,236	N/A	17,848	N/A	19,693	N/A	
1,000-year	26,922	N/A	28,128	N/A	20,766	N/A	21,591	N/A	
2,000-year	28,659	N/A	29,317	N/A	21,942	N/A	22,348	N/A	

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels.


Louisiana Coastal Protection and Restoration
Planning Unit 3a
Eastern Terrebonne Basin
No Action Alternative
(Future Degraded) PU3a-0
November 2007
Donaldsonville
Lake Pontchartrain
New Orleans
Lake Borgne
Lake Maurepas
Napoleonville
Gretna
Westwego
Belle Chasse
Thibodaux
Morgan City
Riceland
Lake Salvador
Lockport
Houma
Larose
Cut Off
Golden Meadow
Dulac
Leeville
Port Fourchon
Legend
Percentage of Water of 500 meter cell
0 - 25%
25 - 50%
50 - 75%
75 - 100%
Primary Roads
Planning Unit Boundary
N
Miles
4 2 0 4 8 12 16 20
Data Source: Coastal Louisiana Ecosystem Assessment and Restoration (CLEAR)


Louisiana Coastal Protection and Restoration
Planning Unit 3a
East Terrebonne Basin
No Action Alternative
(Future Degraded)
PU3a- 0
Planning Subunits - Key Map
Legend
Planning Subunits Listed in Table
Other Planning Subunits
Authorized Levee Alignment
Miles
MRTN_3d
ASSU_3e
MARY_3c
MARY_6g
MARY_3g
TRBN_3e
LAFO_4c
LAFO_6f
TRBN_2b
TRBN_6j
LAFO_7b
TRBN_7j
TRBN_10i
TRBN_9n
TRBN_9h
TRBN_12f
TRBN_12g

Alternative: PU3a-0

Water Surface Elevations (feet - NAVD88 2004.65)

Planning Sub Unit	2010 (Base) Conditions						2060 (Future) Conditions					
	100-yr Event		400-year Event		1,000-yr Event		100-yr Event		400-year Event		1,000-yr Event	
	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project
ASSU_3e	3.7		3.9		4.3		6.9		7.1		7.5	
LAFO_4c	7.0		11.7		13.6		10.2		14.9		16.8	
LAFO_6f	8.4		13.4		16.7		11.6		16.6		19.9	
LAFO_7b	7.8		11.5		13.6		11.0		14.7		16.8	
MARY_2f	6.3		8.5		9.9		9.5		11.7		13.1	
MARY_3c	6.3		10.8		13.1		9.5		14.0		16.3	
MARY_3g	6.1		9.6		11.4		9.3		12.8		14.6	
MARY_5g	7.8		9.9		12.0		11.0		13.1		15.2	
MRTN_3d	3.8		5.9		7.1		7.0		9.1		10.3	
TRBN_10i	11.2		16.1		19.5		14.4		19.3		22.7	
TRBN_12f	13.5		18.0		20.8		16.7		21.2		24.0	
TRBN_12g	13.2		16.9		19.0		16.1		19.6		21.8	
TRBN_2b	6.6		9.5		12.8		9.8		12.7		16.0	
TRBN_3e	4.9		8.8		11.7		8.1		12.0		14.9	
TRBN_6l	7.8		8.8		10.5		11.0		12.0		13.7	
TRBN_7j	9.3		14.0		16.3		12.5		17.2		19.5	
TRBN_8h	9.7		14.5		17.4		14.3		18.7		20.7	
TRBN_9n	8.4		12.1		14.1		11.6		15.3		17.3	

Evaluation Parameters				
	Confidence Level:	90%	Levee Design:	No Friction Waves
	Future Relative Sea Level Rise:	3.2 feet	Levee Overtopping:	No Friction Waves

Planning Unit:	3a	Alt. No.:	3a-R1	Category:	Coastal Restoration Only
Alternative Description:					
Coastal Component:	R1		Nonstructural Component:		None
Structural Component:	No new levees or increases in risk reduction level for existing levees.				

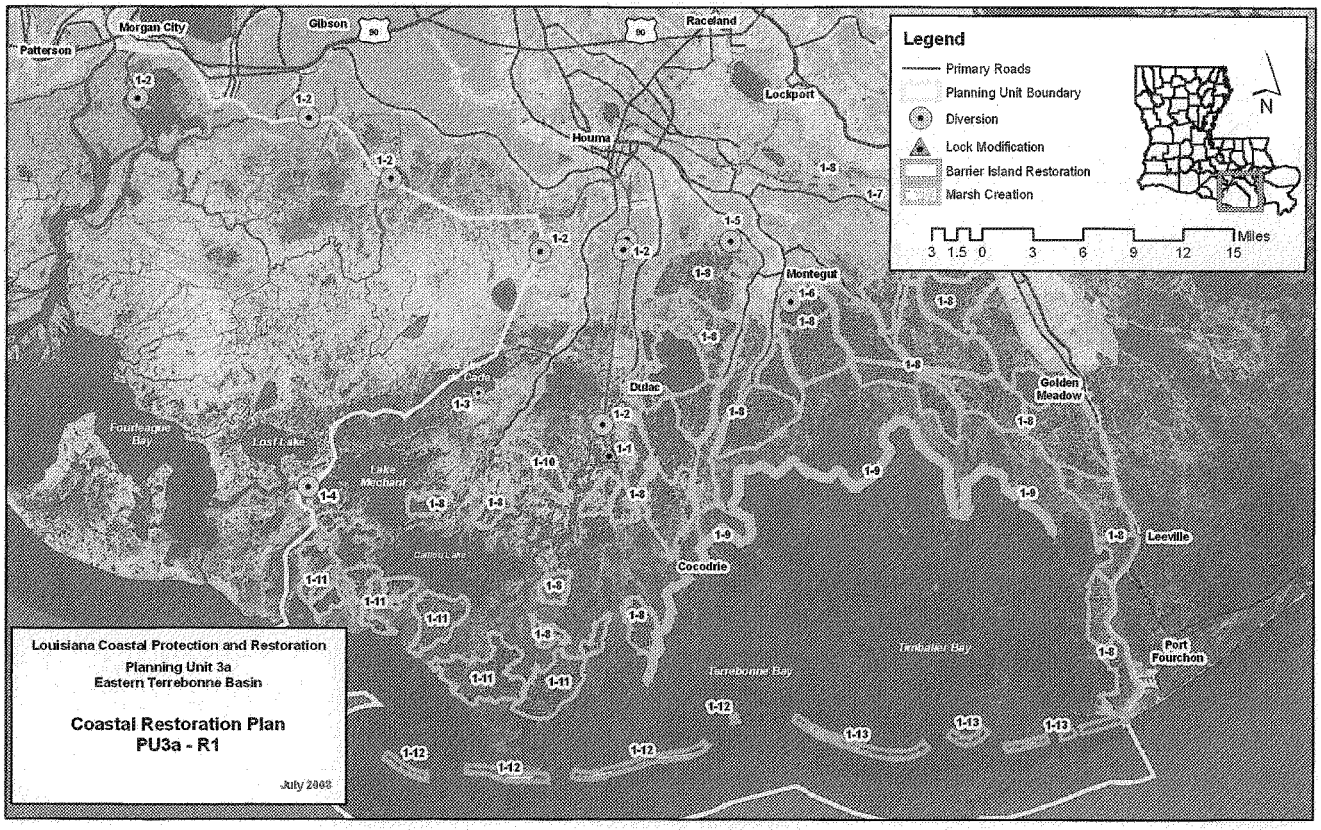
Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	1,189	12,456	490	864	2,317	167	157	10	1
		Mid		16,592	750	1,357	3,929	268	134	6	0
		Low		19,115	1,027	1,796	5,451	366	111	3	0
2	High RSLR High Employment Dispersed Population	High	1,210	14,325	595	1,131	2,873	223	157	10	1
		Mid		18,185	910	1,829	4,952	367	134	6	0
		Low		20,522	1,221	2,090	6,024	424	111	3	0
3	Low RSLR Business-as-Usual Compact Population	High	1,189	10,768	476	843	2,258	161	157	10	1
		Mid		14,958	722	1,272	3,809	257	134	6	0
		Low		17,274	967	1,633	5,163	341	111	3	0
4	High RSLR Business-as-Usual Compact Population	High	1,210	12,171	569	1,140	2,853	221	157	10	1
		Mid		16,142	855	1,684	4,716	345	134	6	0
		Low		18,207	1,117	1,944	5,789	405	111	3	0

Other Results		Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Construction Time (years)	15	After 50 yrs (% of baseline)	98	97	98	97
Direct Wetland Impacts (acres)	0	After 100 yrs (% of baseline)	110	100	110	100
Indirect Impacts (unitless)	0	Present Value of Life Cycle Costs ($ Millions)				
Spatial Integrity (unitless)	0.37	Coastal Component	23,276	23,703	23,276	23,703
Non-Federal Share of Present Value of Life Cycle Costs	Scenario / ($ Millions)	Nonstructural Component	0	0	0	0
	1 / 2: 8,146 / 8,296	Structural Component	0	0	0	0
	3 / 4: 8,146 / 8,296	Total Project	23,276	23,703	23,276	23,703

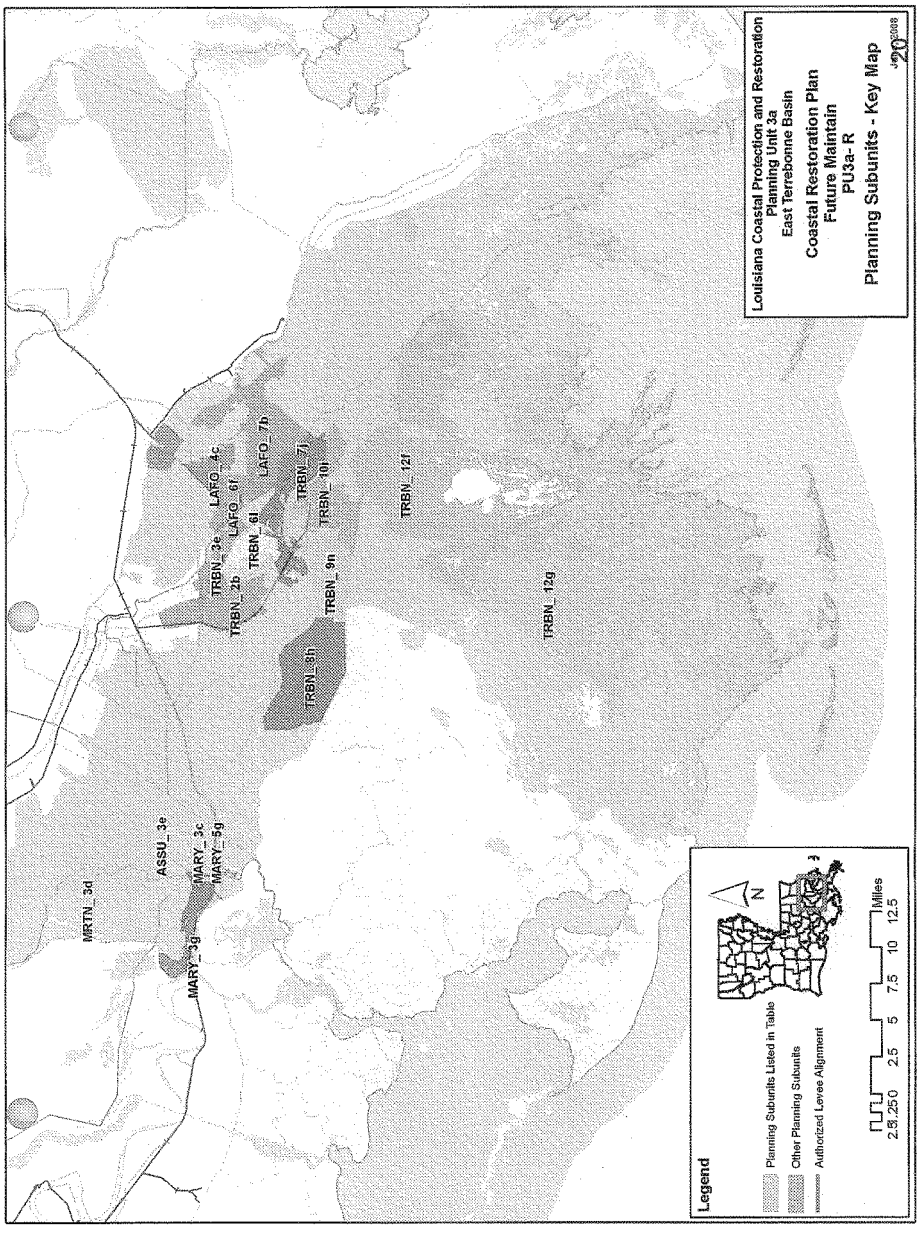
2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 3a Coastal Plan Coastal Restoration Alt
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	
10-year	1,460	1,466	2,472	2,479	1,422	1,428	2,425	2,431	
100-year	10,629	10,574	15,966	15,993	9,695	9,683	13,659	13,697	
400-year	22,650	22,760	25,236	25,351	17,848	17,925	19,693	19,779	
1,000-year	26,922	27,034	28,128	28,244	20,766	20,855	21,591	21,683	
2,000-year	28,659	28,781	29,317	29,437	21,942	22,035	22,348	22,440	

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels.

1892


Legend
Primary Roads
Planning Unit Boundary
Diversion
Lock Modification
Barrier Island Restoration
Marsh Creation
3 1.5 0 3 6 9 12 15 Miles
N
Louisiana Coastal Protection and Restoration
Planning Unit 3a
Eastern Terrebonne Basin
Coastal Restoration Plan
PU3a - R1
July 2008
Morgan City
Patterson
Gibson
Raceland
Lockport
Houma
Montegut
Dulac
Golden Meadow
Cocodrie
Leeville
Port Fourchon
Lake Mechant
Terrebonne Bay
Timbalier Bay

1893


MRTN_3d
ASSU_3e
MARY_3c
MARY_5g
MARY_3g
TRBN_3e
LAFO_4c
LAFO_6f
TRBN_2b
TRBN_6l
LAFO_7b
TRBN_7j
TRBN_10l
TRBN_9n
TRBN_8h
TRBN_12l
TRBN_12g
Legend
Planning Subunits Listed in Table
Other Planning Subunits
Authorized Levee Alignment
N
0 2.5 5 7.5 10 12.5
Miles
Louisiana Coastal Protection and Restoration
Planning Unit 3a
East Terrebonne Basin
Coastal Restoration Plan
Future Maintain
PU3a- R
Planning Subunits - Key Map
Jan 2008

Alternative: PU3a-R1

Water Surface Elevations (feet - NAVD88 2004.65)

Planning Sub Unit	2010 (Base) Conditions*						2060 (Future) Conditions					
	100-yr Event		400-year Event		1,000-yr Event		100-yr Event		400-year Event		1,000-yr Event	
	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project
ASSU_3e	3.7	3.7	3.9	3.9	4.3	4.3	6.9	6.9	7.1	7.1	7.5	7.5
LAFO_4c	7.0	7.0	11.7	11.7	13.6	13.6	10.2	10.2	14.9	14.9	16.8	16.8
LAFO_6f	8.4	8.4	13.4	13.4	16.7	16.7	11.6	11.6	16.6	16.6	19.9	19.9
LAFO_7b	7.8	7.8	11.5	11.5	13.6	13.6	11.0	11.0	14.7	14.7	16.8	16.8
MARY_2f	6.3	6.3	8.5	8.5	9.9	9.9	9.5	9.5	11.7	11.7	13.1	13.1
MARY_3c	6.3	6.3	10.8	10.8	13.1	13.1	9.5	9.5	14.0	14.0	16.3	16.3
MARY_3g	6.1	6.1	9.6	9.6	11.4	11.4	9.3	9.3	12.8	12.8	14.6	14.6
MARY_5g	7.8	7.8	9.9	9.9	12.0	12.0	11.0	11.0	13.1	13.1	15.2	15.2
MRTN_3d	3.8	3.8	5.9	5.9	7.1	7.1	7.0	7.0	9.1	9.1	10.3	10.3
TRBN_10i	11.2	11.2	16.1	16.1	19.5	19.5	14.4	14.4	19.3	19.3	22.7	22.7
TRBN_12f	13.5	13.5	18.0	18.0	20.8	20.8	16.7	16.7	21.2	21.2	24.0	24.0
TRBN_12g	13.2	13.2	16.9	16.9	19.0	19.0	16.1	16.4	19.6	20.1	21.8	22.2
TRBN_2b	6.6	6.6	9.5	9.5	12.8	12.8	9.8	9.8	12.7	12.7	16.0	16.0
TRBN_3e	4.9	4.9	8.8	8.8	11.7	11.7	8.1	8.1	12.0	12.0	14.9	14.9
TRBN_6l	7.8	7.8	8.8	8.8	10.5	10.5	11.0	11.0	12.0	12.0	13.7	13.7
TRBN_7j	9.3	9.3	14.0	14.0	16.3	16.3	12.5	12.5	17.2	17.2	19.5	19.5
TRBN_8h	9.7	9.7	14.5	14.5	17.4	17.4	14.3	12.9	18.7	17.7	20.7	20.6
TRBN_9n	8.4	8.4	12.1	12.1	14.1	14.1	11.6	11.6	15.3	15.3	17.3	17.3

Evaluation Parameters				
	Confidence Level:	90%	Levee Design:	No Friction Waves
	Future Relative Sea Level Rise:	3.2 feet	Levee Overtopping:	No Friction Waves

* With and without project base conditions (2010) are the same for coastal restoration only plans.

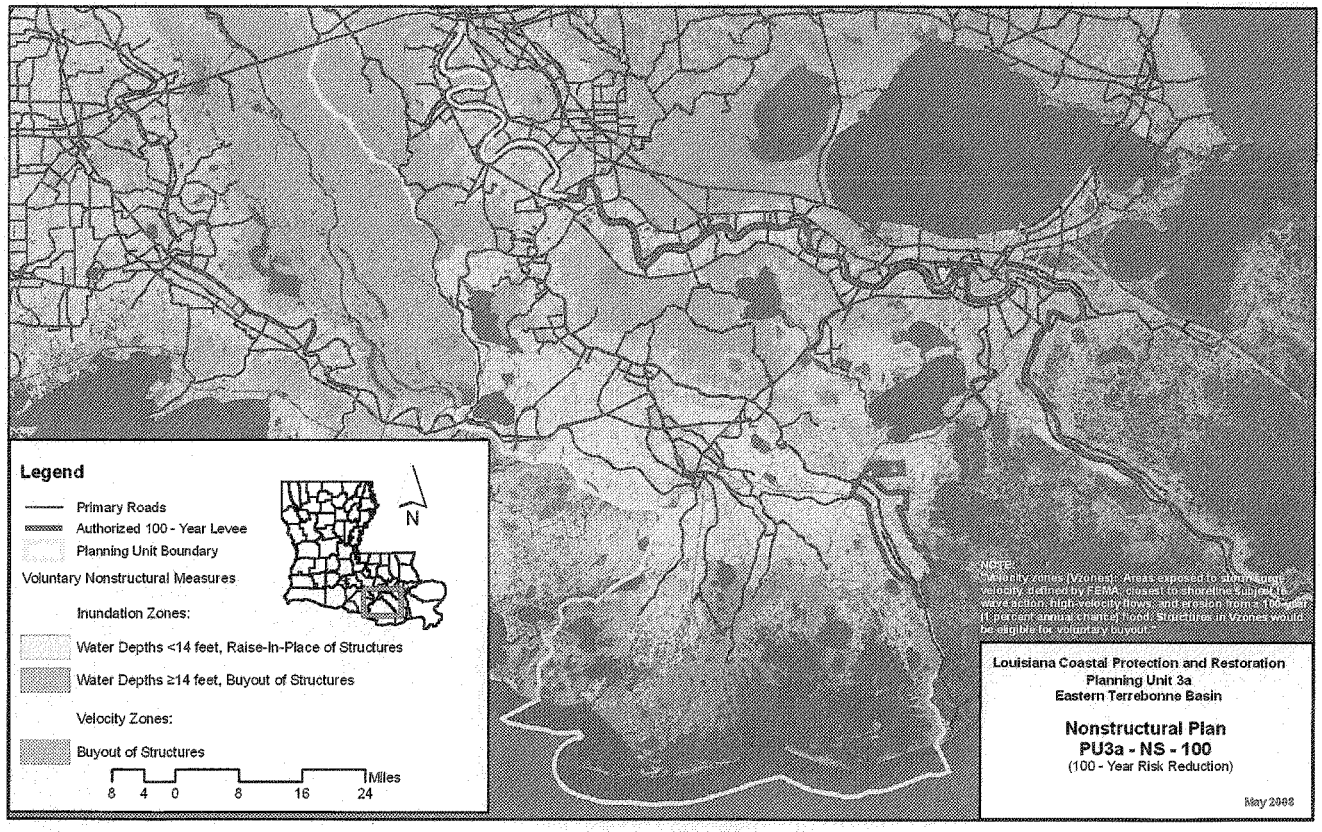
Planning Unit:	3a	Alt. No.:	PUS. NS-100	Category:	Coastal Restoration + Nonstructural Measures
Alternative Description:	Sustain coastal landscape through restoration. Implement comprehensive 100-year nonstructural measures.				
Coastal Component:	R1		Nonstructural Component:		100-yr stand alone measures
Structural Component:	No new levees or increases in risk reduction level for existing levees.				

Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	1,587	11,127	195	279	902	54	157	10	1
		Mid		15,021	327	640	2,047	127	134	6	0
		Low		17,559	512	932	3,078	193	111	3	0
2	High RSLR High Employment Dispersed Population	High	1,609	12,090	225	407	1,154	81	157	10	1
		Mid		15,841	406	861	2,550	175	134	6	0
		Low		18,284	625	1,032	3,313	214	111	3	0
3	Low RSLR Business-as-Usual Compact Population	High	1,587	9,856	189	257	852	49	157	10	1
		Mid		13,882	313	591	1,989	121	134	6	0
		Low		16,267	476	843	2,926	179	111	3	0
4	High RSLR Business-as-Usual Compact Population	High	1,608	10,579	212	267	1,120	77	157	10	1
		Mid		14,492	377	552	2,424	163	134	6	0
		Low		16,747	566	671	3,181	203	111	3	0

Other Results			Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Construction Time (years)		15	After 50 yrs (% of baseline)	98	97	98	97
Direct Wetland Impacts (acres)		0	After 100 yrs (% of baseline)	110	100	110	100
Indirect Impacts (unitless)		0	Present Value of Life Cycle Costs ($ Millions)				
Spatial Integrity (unitless)		0.37	Coastal Component	23,276	23,703	23,276	23,703
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)	Nonstructural Component	7,827	7,827	7,811	7,811
	1 / 2	10,886 11,035	Structural Component	0	0	0	0
	3 / 4	10,880 11,030	Total Project	31,102	31,530	31,086	31,514

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 3a
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	
10-year	1,460	179	2,472	401	1,422	161	2,425	365	Nonstructural Plan
100-year	10,629	5,111	15,966	12,047	9,695	4,257	13,659	9,796	
400-year	22,650	20,976	25,236	24,215	17,848	16,213	19,693	18,694	
1,000-year	26,922	26,215	28,128	27,711	20,766	20,075	21,591	21,178	100-year Design
2,000-year	28,659	28,308	29,317	29,086	21,942	21,587	22,348	22,107	

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels.


Legend
Primary Roads
Authorized 100 - Year Levee
Planning Unit Boundary
Voluntary Nonstructural Measures
Inundation Zones:
Water Depths <14 feet, Raise-In-Place of Structures
Water Depths ≥14 feet, Buyout of Structures
Velocity Zones:
Buyout of Structures
N
8 4 0 8 16 24
Miles
NOTE:
Louisiana Coastal Protection and Restoration
Planning Unit 3a
Eastern Terrebonne Basin
Nonstructural Plan
PU3a - NS - 100
(100 - Year Risk Reduction)
May 2008

1897

Planning Unit:	3a	Alt. No.:	PUS...NS-400	Category:	Coastal Restoration + Nonstructural Measures
Alternative Description:	Sustain coastal landscape through restoration. Implement comprehensive 400-year nonstructural measures.				
Coastal Component:	R1		Nonstructural Component:		400-yr stand alone measures
Structural Component:	No new levees or increases in risk reduction level for existing levees.				

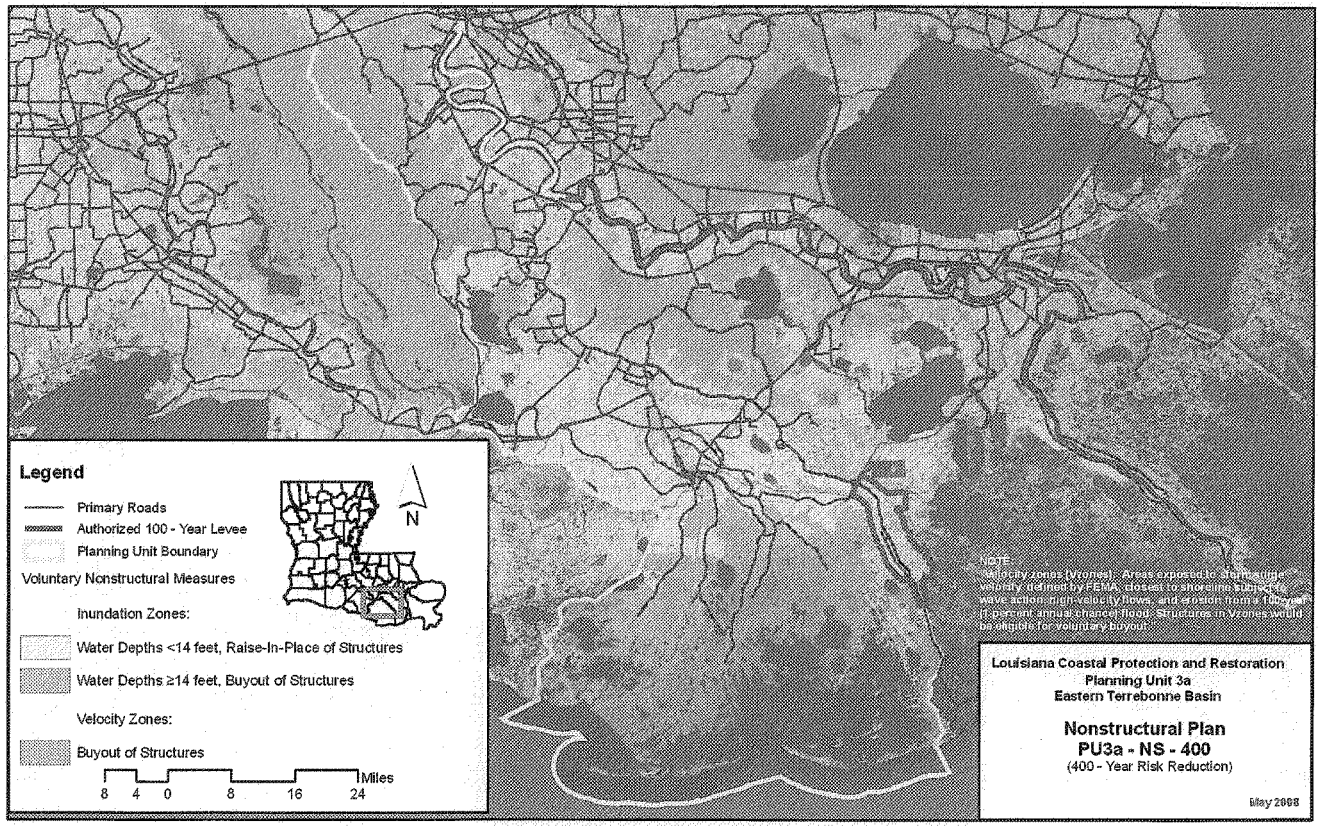
Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	1,733	9,442	159	153	603	28	157	10	1
		Mid		13,320	249	289	1,149	56	134	6	0
		Low		15,858	365	460	1,805	94	111	3	0
2	High RSLR High Employment Dispersed Population	High	1,755	10,389	165	165	628	31	157	10	1
		Mid		14,140	270	378	1,335	75	134	6	0
		Low		16,583	403	548	1,992	113	111	3	0
3	Low RSLR Business-as-Usual Compact Population	High	1,724	8,300	156	154	604	28	157	10	1
		Mid		12,317	242	287	1,157	56	134	6	0
		Low		14,702	348	463	1,770	93	111	3	0
4	High RSLR Business-as-Usual Compact Population	High	1,746	9,014	161	40	631	31	157	10	1
		Mid		12,927	260	165	1,343	76	134	6	0
		Low		15,183	380	280	1,995	115	111	3	0

Other Results			Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Construction Time (years)		15	After 50 yrs (% of baseline)	98	97	98	97
Direct Wetland Impacts (acres)		0	After 100 yrs (% of baseline)	110	100	110	100
Indirect Impacts (unitless)		0	Present Value of Life Cycle Costs ($ Millions)				
Spatial Integrity (unitless)		0.37	Coastal Component	23,276	23,703	23,276	23,703
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)	Nonstructural Component	10,683	10,683	10,516	10,516
	1 / 2	11,886 12,035	Structural Component	0	0	0	0
	3 / 4	11,827 11,977	Total Project	33,959	34,386	33,792	34,219

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 3a
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	
10-year	1,460	123	2,472	221	1,422	112	2,425	226	Nonstructural Plan
100-year	10,629	1,271	15,966	3,002	9,695	1,148	13,659	2,601	
400-year	22,650	8,151	25,236	15,182	17,848	6,366	19,693	11,875	
1,000-year	26,922	19,436	28,128	22,703	20,766	14,870	21,591	17,415	400-year Design
2,000-year	28,659	23,655	29,317	25,586	21,942	18,102	22,348	19,453	

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels.

1898


Legend
Primary Roads
Authorized 100 - Year Levee
Planning Unit Boundary
Voluntary Nonstructural Measures
Inundation Zones:
Water Depths <14 feet, Raise-In-Place of Structures
Water Depths ≥14 feet, Buyout of Structures
Velocity Zones:
Buyout of Structures
N
8 4 0 8 16 24
Miles
NOTE:
Louisiana Coastal Protection and Restoration
Planning Unit 3a
Eastern Terrebonne Basin
Nonstructural Plan
PU3a - NS - 400
(400 - Year Risk Reduction)
May 2008

1899

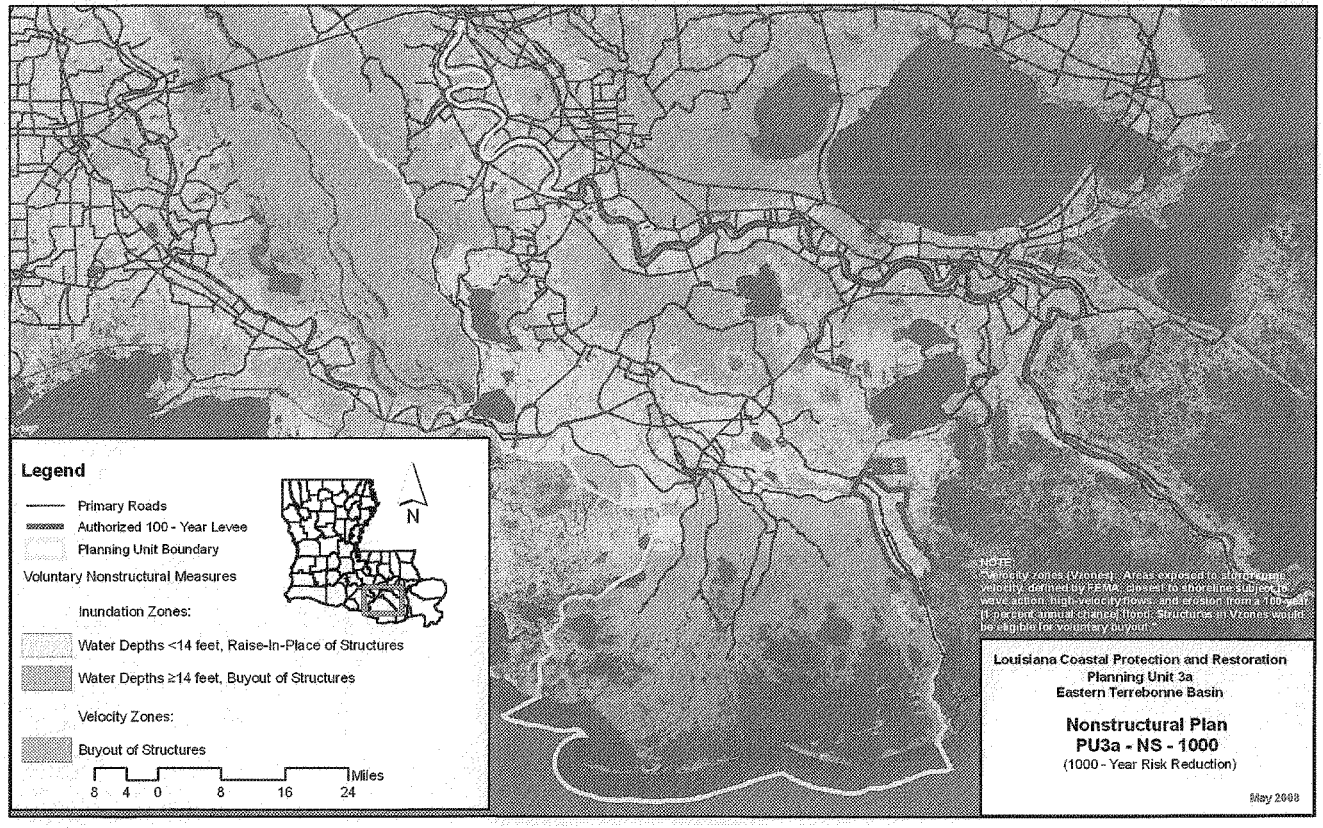
Planning Unit:	3a	Alt. No.:	PUSACENS-1000	Category:	Coastal Restoration + Nonstructural Measures
Alternative Description:	Sustain coastal landscape through restoration. Implement comprehensive 1000-year nonstructural measures.				
Coastal Component:	R1		Nonstructural Component:		1000-yr stand alone measures
Structural Component:	No new levees or increases in risk reduction level for existing levees.				

Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	1,786	8,229	152	134	557	25	157	10	1
		Mid		12,045	235	237	1,007	45	134	6	0
		Low		14,544	330	319	1,457	65	111	3	0
2	High RSLR High Employment Dispersed Population	High	1,808	9,161	155	145	581	27	157	10	1
		Mid		12,852	243	267	1,071	52	134	6	0
		Low		15,262	344	444	1,727	91	111	3	0
3	Low RSLR Business-as-Usual Compact Population	High	1,798	7,368	149	135	560	25	157	10	1
		Mid		11,326	230	235	1,009	45	134	6	0
		Low		13,678	317	317	1,424	63	111	3	0
4	High RSLR Business-as-Usual Compact Population	High	1,819	8,076	151	13	579	27	157	10	1
		Mid		11,931	236	48	1,073	52	134	6	0
		Low		14,157	329	175	1,683	89	111	3	0

Other Results			Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Construction Time (years)		15	After 50 yrs (% of baseline)	98	97	98	97
Direct Wetland Impacts (acres)		0	After 100 yrs (% of baseline)	110	100	110	100
Indirect Impacts (unitless)		0	Present Value of Life Cycle Costs ($ Millions)				
Spatial Integrity (unitless)		0.37	Coastal Component	23,276	23,703	23,276	23,703
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)	Nonstructural Component	11,724	11,724	11,954	11,954
	1 / 2	12,250	Structural Component	0	0	0	0
	3 / 4	12,331	Total Project	34,999	35,427	35,230	35,657

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 3a
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	
10-year	1,460	79	2,472	159	1,422	73	2,425	145	Nonstructural Plan
100-year	10,629	717	15,966	1,232	9,695	652	13,659	1,108	
400-year	22,650	3,068	25,236	4,819	17,848	2,199	19,693	3,555	
1,000-year	26,922	8,156	28,128	15,160	20,766	5,917	21,591	11,435	1000-year Design
2,000-year	28,659	16,545	29,317	20,336	21,942	12,660	22,348	15,570	

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels.


Legend
Primary Roads
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Water Depths <14 feet, Raise-In-Place of Structures
Water Depths ≥14 feet, Buyout of Structures
Velocity Zones:
Buyout of Structures
8 4 0 8 16 24 Miles
N
NOTE:
"Velocity zones (Vzones): Areas exposed to storm-borne velocity, defined by FEMA, closest to shoreline subject to wave action, high-velocity flows, and erosion from a 100-year (1-percent annual chance) flood. Structures in Vzones would be eligible for voluntary buyout."
Louisiana Coastal Protection and Restoration
Planning Unit 3a
Eastern Terrebonne Basin
Nonstructural Plan
PU3a - NS - 1000
(1000 - Year Risk Reduction)
May 2008

Planning Unit:	3a	Alt. No.:	PU3_100-1	Category:	Coastal Restoration + Structural Measures
Alternative Description:	Sustain coastal landscape through restoration. Construct Morganza to the Gulf levee with extension tying into high ground west of Morgan City at 100-year design level.				
Coastal Component:	R1	Nonstructural Component:	None		
Structural Component:	See alternative description above.				

Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	2,282	5,918	236	333	1,022	62	203	18	1
		Mid		7,658	343	539	1,790	102	180	17	1
		Low		9,106	474	677	2,444	136	157	13	0
2	High RSLR High Employment Dispersed Population	High	2,330	6,165	253	407	1,149	76	203	18	1
		Mid		7,878	367	638	1,977	122	180	14	1
		Low		9,285	503	757	2,578	151	157	8	0
3	Low RSLR Business-as-Usual Compact Population	High	2,282	5,249	231	334	1,017	63	203	18	1
		Mid		7,041	334	528	1,776	102	180	17	1
		Low		8,388	455	653	2,392	132	157	13	0
4	High RSLR Business-as-Usual Compact Population	High	2,330	5,433	246	265	1,161	79	203	18	1
		Mid		7,198	354	363	1,958	121	180	14	1
		Low		8,507	478	417	2,544	150	157	8	0

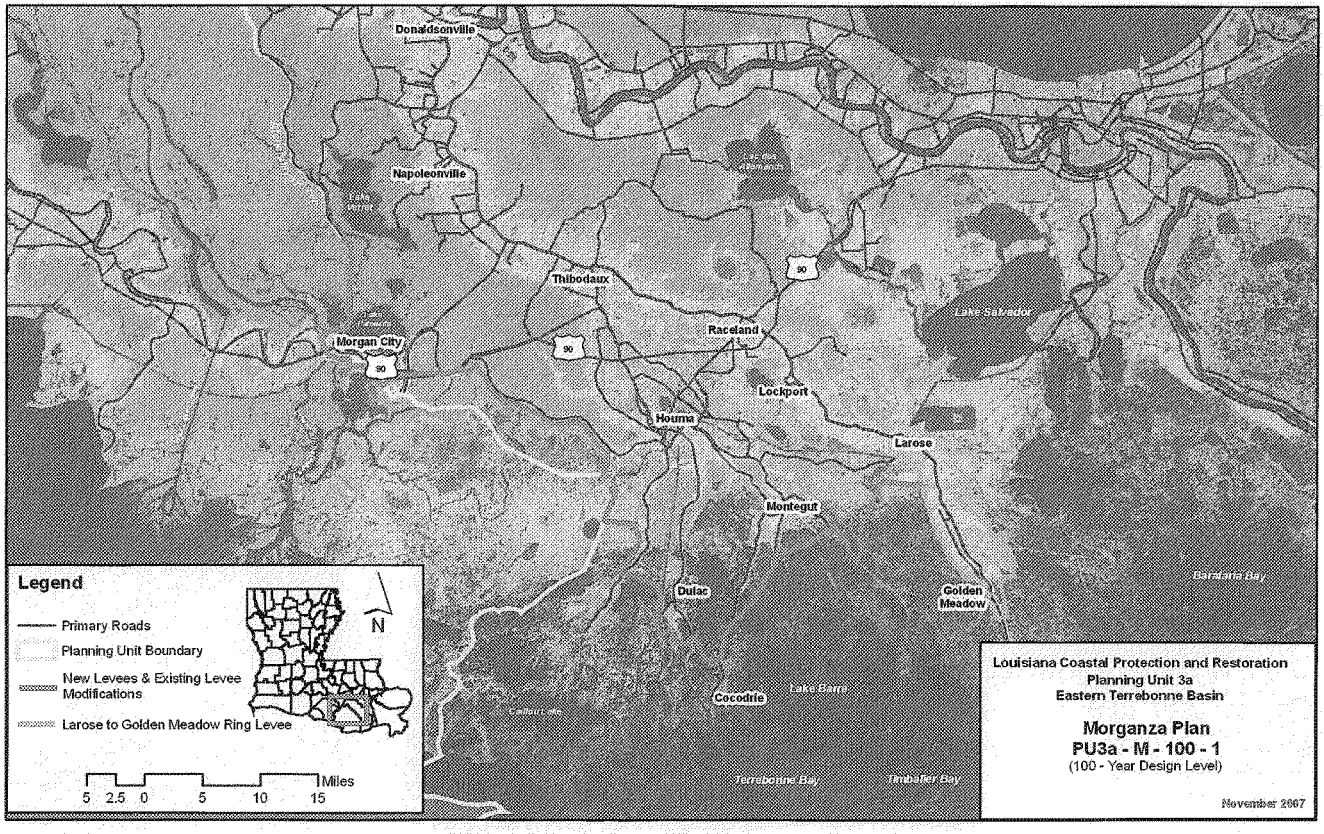
Other Results	
Construction Time (years)	10
Direct Wetland Impacts (acres)	4,900
Indirect Impacts (unitless)	-7
Spatial Integrity (unitless)	0.37

Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)	
	1 / 2	15,791	16,121
	3 / 4	15,791	16,121

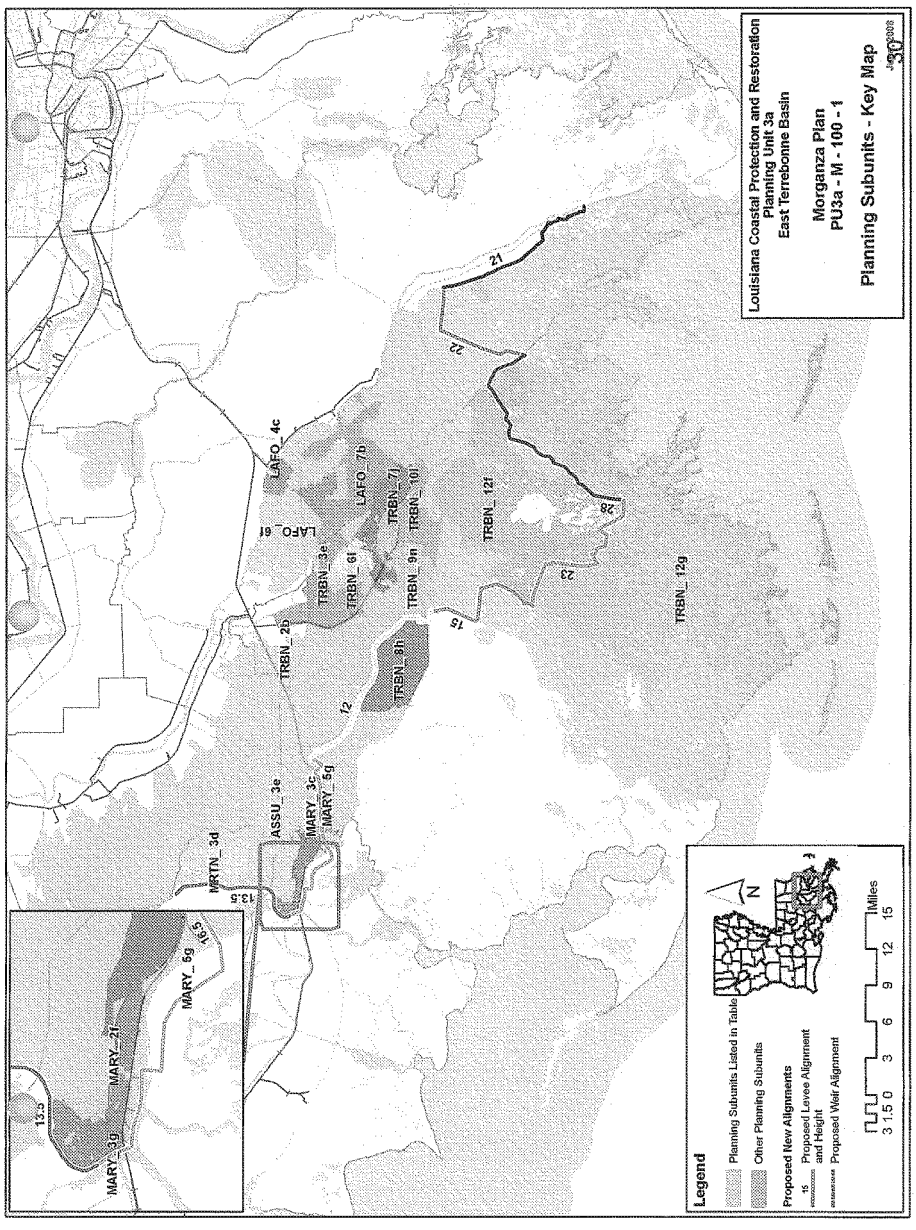
Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
After 50 yrs (% of baseline)	98	97	98	97
After 100 yrs (% of baseline)	110	100	110	100
Present Value of Life Cycle Costs ($ Millions)				
Coastal Component	23,276	23,703	23,276	23,703
Nonstructural Component	0	0	0	0
Structural Component	21,412	21,928	21,412	21,928
Total Project	44,688	45,631	44,688	45,631

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 3a
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	Structural Plan
10-year	1,460	347	2,472	445	1,422	329	2,425	431	Morganza Alt
100-year	10,629	873	15,966	996	9,695	859	13,659	946	
400-year	22,650	2,015	25,236	2,046	17,848	1,891	19,693	1,924	
1,000-year	26,922	15,270	28,128	15,273	20,766	12,948	21,591	12,951	100-year Design
2,000-year	28,659	20,250	29,317	20,251	21,942	16,667	22,348	16,669	

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels.


Donaldsonville
Napoleonville
Thibodaux
Raceland
Morgan City
90
Lockport
Houma
Larose
Montegut
Dulac
Golden Meadow
Cocodrie
Lake Barre
Lake Salvador
Terrebonne Bay
Timbalier Bay
Legend
Primary Roads
Planning Unit Boundary
New Levees & Existing Levee Modifications
Larose to Golden Meadow Ring Levee
N
Miles
5 2.5 0 5 10 15
Louisiana Coastal Protection and Restoration
Planning Unit 3a
Eastern Terrebonne Basin
Morganza Plan
PU3a - M - 100 - 1
(100 - Year Design Level)
November 2007

1903


Louisiana Coastal Protection and Restoration
Planning Unit 3a
East Terrebonne Basin
Morganza Plan
PU3a - M - 100 - 1
Planning Subunits - Key Map
Legend
Planning Subunits Listed in Table
Other Planning Subunits
Proposed New Alignments
Proposed Levee Alignment and Height
Proposed Weir Alignment
Miles
3 1.5 0 3 6 9 12 15
N
MARY_2f
MARY_3g
MARY_5g
MRTN_3d
ASSU_3e
MARY_3c
MARY_5g
TRBN_2b
TRBN_3e
TRBN_6f
LAFO_6f
LAFO_4c
LAFO_7b
TRBN_7j
TRBN_8h
TRBN_9n
TRBN_10f
TRBN_12f
TRBN_12g
12
15
21
22
23
28

Alternative: PU3a-M-100-1

Water Surface Elevations (feet - NAVD88 2004.65)

Planning Sub Unit	2010 (Base) Conditions						2060 (Future) Conditions					
	100-yr Event		400-year Event		1,000-yr Event		100-yr Event		400-year Event		1,000-yr Event	
	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project
ASSU_3e	3.7	2.4	3.9	4.8	4.3	9.1	6.9	2.4	7.1	4.8	7.5	9.1
LAFO_4c	7.0	1.0	11.7	4.8	13.6	10.9	10.2	1.0	14.9	4.8	16.8	10.9
LAFO_6f	8.4	1.0	13.4	4.8	16.7	10.9	11.6	1.0	16.6	4.8	19.9	10.9
LAFO_7b	7.8	1.0	11.5	4.8	13.6	10.9	11.0	1.0	14.7	4.8	16.8	10.9
MARY_2f	6.3	2.4	8.5	4.8	9.9	9.1	9.5	2.4	11.7	4.8	13.1	9.1
MARY_3c	6.3	2.4	10.8	4.8	13.1	9.1	9.5	2.4	14.0	4.8	16.3	9.1
MARY_3g	6.1	2.4	9.6	4.8	11.4	9.1	9.3	2.4	12.8	4.8	14.6	9.1
MARY_5g	7.8	2.4	9.9	4.8	12.0	9.1	11.0	2.4	13.1	4.8	15.2	9.1
MRTN_3d	3.8	2.4	5.9	4.8	7.1	9.1	7.0	2.4	9.1	4.8	10.3	9.1
TRBN_10i	11.2	1.0	16.1	4.8	19.5	10.9	14.4	1.0	19.3	4.8	22.7	10.9
TRBN_12f	13.5	1.0	18.0	4.8	20.8	10.9	16.7	1.0	21.2	4.8	24.0	10.9
TRBN_12g	13.2	14.7	16.9	18.9	19.0	21.3	16.1	17.9	19.6	22.1	21.8	24.5
TRBN_2b	6.6	1.0	9.5	4.8	12.8	10.9	9.8	1.0	12.7	4.8	16.0	10.9
TRBN_3e	4.9	1.0	8.8	4.8	11.7	10.9	8.1	1.0	12.0	4.8	14.9	10.9
TRBN_6l	7.8	1.0	8.8	4.8	10.5	10.9	11.0	1.0	12.0	4.8	13.7	10.9
TRBN_7j	9.3	1.0	14.0	4.8	16.3	10.9	12.5	1.0	17.2	4.8	19.5	10.9
TRBN_8h	9.7	9.9	14.5	14.8	17.4	17.7	14.3	13.1	18.7	18.0	20.7	20.9
TRBN_9n	8.4	1.0	12.1	4.8	14.1	10.9	11.6	1.0	15.3	4.8	17.3	10.9

Evaluation Parameters						
	Confidence Level:	90%		Levee Design:	No Friction Waves	
	Future Relative Sea Level Rise:	3.2 feet		Levee Overtopping:	No Friction Waves	

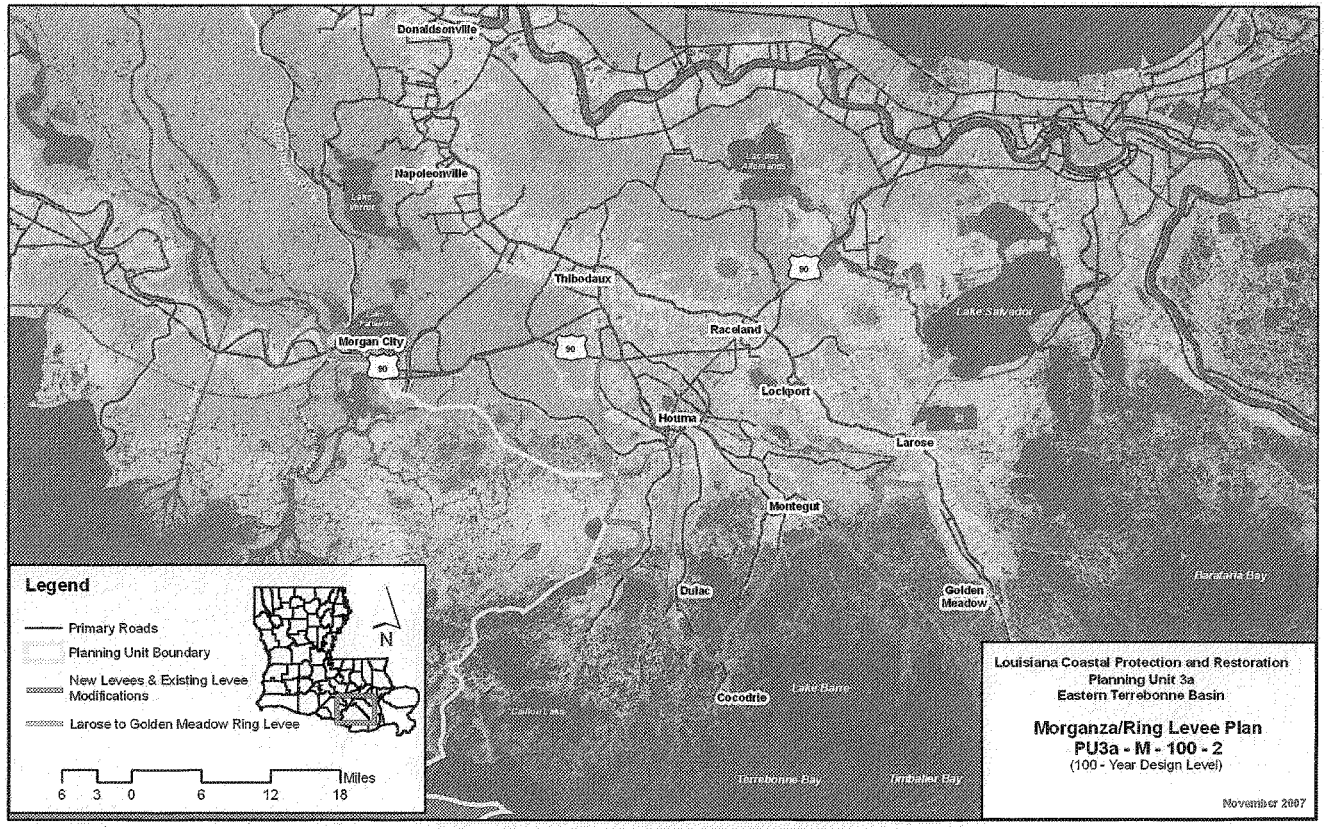
Planning Un	3a	Alt. No.:	PU	-100-2	Category:	Coastal Restoration + Structura	easures
Alternative Description:	Sustain coastal landscape through restoration. Construct Morganza to the Gulf levee with with tieback to high ground south of Thibodaux and ring levee around Morgan City at 100-year design level.						
Coastal Component:	R1			Nonstructural Component:		None	
Structural Component:	See alternative description above.						

Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	2,158	6,053	245	358	1,036	66	174	17	1
		Mid		8,182	374	579	1,854	110	151	14	1
		Low		9,937	537	747	2,606	149	128	10	0
2	High RSLR High Employment Dispersed Population	High	2,186	6,516	273	456	1,199	85	174	15	1
		Mid		8,554	413	697	2,065	133	151	11	0
		Low		10,221	579	843	2,763	168	128	8	0
3	Low RSLR Business-as-Usual Compact Population	High	2,158	5,341	240	365	1,034	67	174	17	1
		Mid		7,507	365	577	1,844	110	151	14	1
		Low		9,148	518	731	2,556	146	128	10	0
4	High RSLR Business-as-Usual Compact Population	High	2,186	5,698	267	323	1,218	88	174	15	1
		Mid		7,788	400	431	2,053	133	151	11	0
		Low		9,331	553	514	2,735	167	128	8	0

Other Results			Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Construction Time (years)		10	After 50 yrs (% of baseline)	98	97	98	97
Direct Wetland Impacts (acres)		4,200	After 100 yrs (% of baseline)	110	100	110	100
Indirect Impacts (unitless)		-4	Present Value of Life Cycle Costs ($ Millions)				
Spatial Integrity (unitless)		0.37	Coastal Component	23,276	23,703	23,276	23,703
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)	Nonstructural Component	0	0	0	0
	1 / 2	14,974 15,164	Structural Component	18,983	19,098	18,983	19,098
	3 / 4	14,974 15,164	Total Project	42,258	42,801	42,258	42,801

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 3a
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		Structural Plan
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	Morganza Alt
10-year	1,460	399	2,472	725	1,422	390	2,425	762	100-year Design
100-year	10,629	2,082	15,966	2,670	9,695	2,056	13,659	2,532	
400-year	22,650	5,312	25,236	5,528	17,848	4,933	19,693	5,088	
1,000-year	26,922	20,567	28,128	20,702	20,766	16,857	21,591	16,937	
2,000-year	28,659	20,763	29,317	20,780	21,942	17,002	22,348	17,028	

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels.


Donaldsonville
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Lockport
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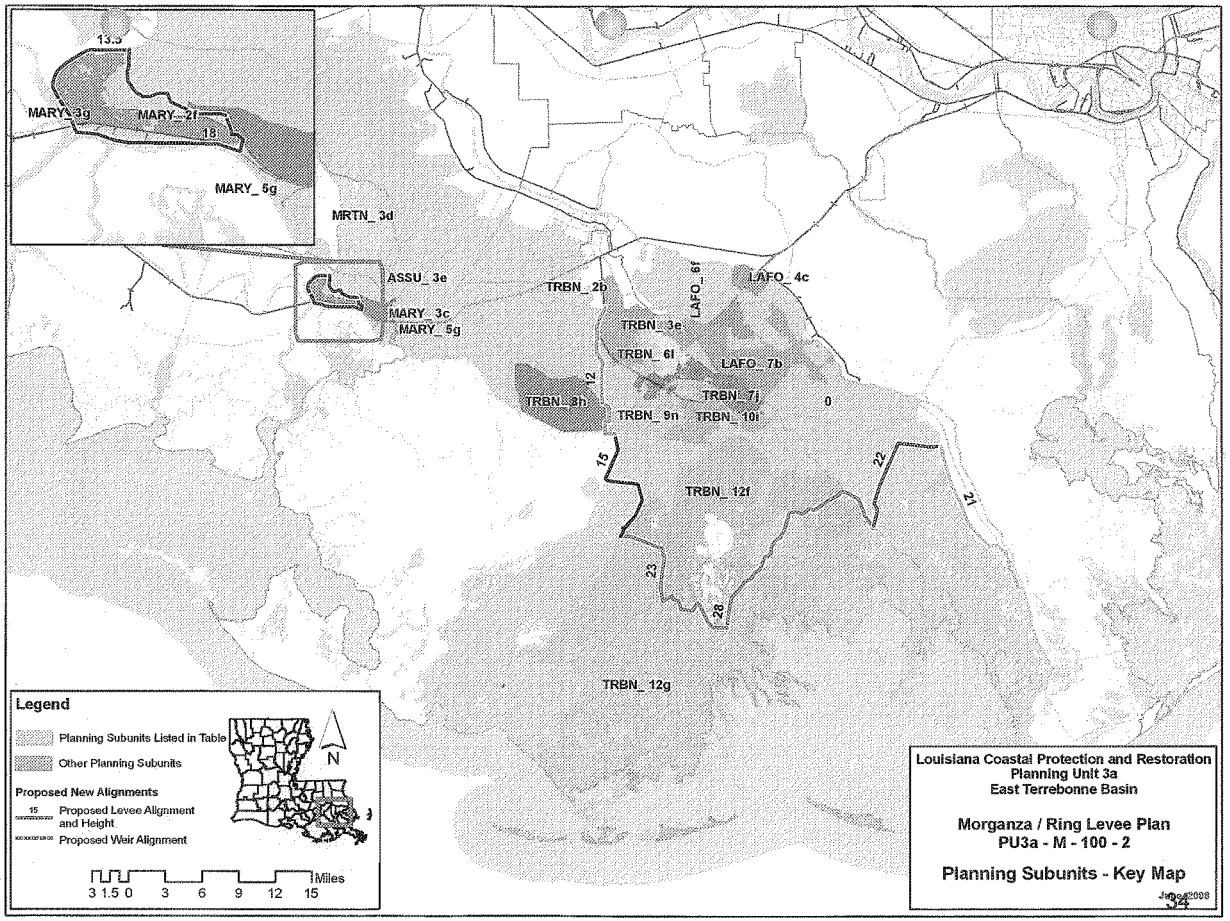
Montegut
Dulac
Golden Meadow
Cocodrie
Lake Barre
Terrebonne Bay
Timbalier Bay
Barataria Bay
Lake Salvador
90
Legend
Primary Roads
Planning Unit Boundary
New Levees & Existing Levee Modifications
Larose to Golden Meadow Ring Levee
N
6 3 0 6 12 18
Miles
Louisiana Coastal Protection and Restoration
Planning Unit 3a
Eastern Terrebonne Basin
Morganza/Ring Levee Plan
PU3a - M - 100 - 2
(100 - Year Design Level)
November 2007

1907


MARY_3g
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18
MARY_5g
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ASSU_3e
MARY_3c
MARY_5g
TRBN_2b
LAFO_6f
LAFO_4c
TRBN_3e
TRBN_6l
LAFO_7b
12
TRBN_8h
TRBN_7j
TRBN_9n
TRBN_10l
0
15
22
21
TRBN_12f
23
28
TRBN_12g
Legend
Planning Subunits Listed in Table
Other Planning Subunits
Proposed New Alignments
15 Proposed Levee Alignment and Height
Proposed Weir Alignment
N
3 1.5 0 3 6 9 12 15 Miles
Louisiana Coastal Protection and Restoration
Planning Unit 3a
East Terrebonne Basin
Morganza / Ring Levee Plan
PU3a - M - 100 - 2
Planning Subunits - Key Map
June 2008

Alternative: PU3a-M-100-2

Water Surface Elevations (feet - NAVD88 2004.65)

Planning Sub Unit	2010 (Base) Conditions						2060 (Future) Conditions					
	100-yr Event		400-year Event		1,000-yr Event		100-yr Event		400-year Event		1,000-yr Event	
	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project
ASSU_3e	3.7	4.4	3.9	4.6	4.3	5.0	6.9	7.6	7.1	7.8	7.5	8.2
LAFO_4c	7.0	1.1	11.7	5.7	13.6	12.0	10.2	1.1	14.9	5.7	16.8	12.0
LAFO_6f	8.4	1.1	13.4	5.7	16.7	12.0	11.6	1.1	16.6	5.7	19.9	12.0
LAFO_7b	7.8	1.1	11.5	5.7	13.6	12.0	11.0	1.1	14.7	5.7	16.8	12.0
MARY_2f	6.3	1.3	8.5	10.1	9.9	18.0	9.5	1.3	11.7	10.1	13.1	18.0
MARY_3c	6.3	7.0	10.8	11.5	13.1	13.9	9.5	10.2	14.0	14.7	16.3	17.1
MARY_3g	6.1	1.3	9.6	10.1	11.4	18.0	9.3	1.3	12.8	10.1	14.6	18.0
MARY_5g	7.8	8.5	9.9	10.6	12.0	12.7	11.0	11.7	13.1	13.8	15.2	15.9
MRTN_3d	3.8	4.5	5.9	6.6	7.1	7.8	7.0	7.7	9.1	9.8	10.3	11.0
TRBN_10i	11.2	1.1	16.1	5.7	19.5	12.0	14.4	1.1	19.3	5.7	22.7	12.0
TRBN_12f	13.5	1.1	18.0	5.7	20.8	12.0	16.7	1.1	21.2	5.7	24.0	12.0
TRBN_12g	13.2	14.7	16.9	18.9	19.0	21.3	16.1	17.9	19.6	22.1	21.8	24.5
TRBN_2b	6.6	1.1	9.5	5.7	12.8	12.0	9.8	1.1	12.7	5.7	16.0	12.0
TRBN_3e	4.9	1.1	8.8	5.7	11.7	12.0	8.1	1.1	12.0	5.7	14.9	12.0
TRBN_6l	7.8	1.1	8.8	5.7	10.5	12.0	11.0	1.1	12.0	5.7	13.7	12.0
TRBN_7j	9.3	1.1	14.0	5.7	16.3	12.0	12.5	1.1	17.2	5.7	19.5	12.0
TRBN_8h	9.7	9.9	14.5	14.8	17.4	17.7	14.3	13.1	18.7	18.0	20.7	20.9
TRBN_9n	8.4	1.1	12.1	5.7	14.1	12.0	11.6	1.1	15.3	5.7	17.3	12.0

Evaluation Parameters				
	Confidence Level:	90%	Levee Design:	No Friction Waves
	Future Relative Sea Level Rise:	3.2 feet	Levee Overtopping:	No Friction Waves

1909

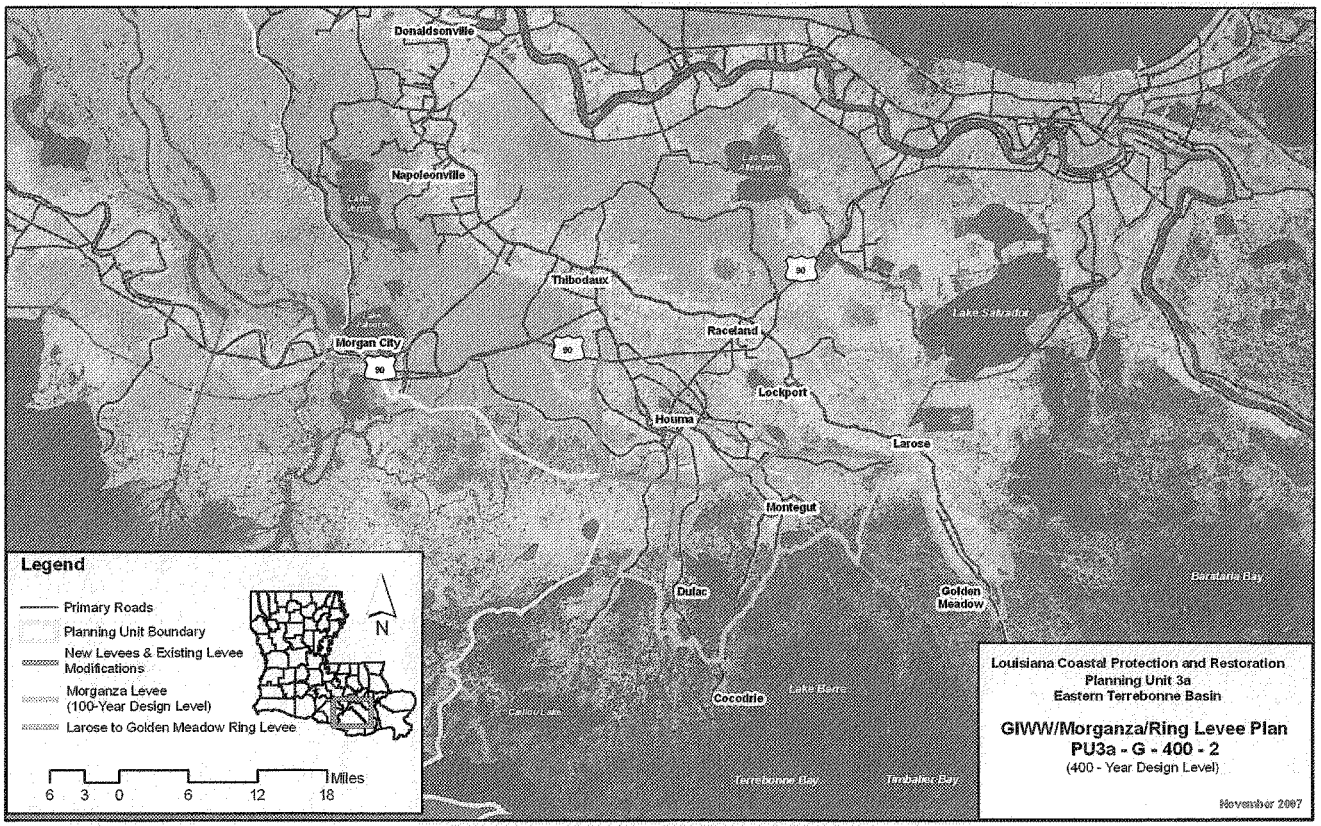
Planning Un	3a	Alt. No.:	PU[illegible]-400-2	Category:	Coastal Restoration + Structura[illegible]easures
Alternative Description:	Sustain coastal landscape through restoration. Construct Morganza to the Gulf levee at the 100-year design level with a second levee along the GIWW with tieback to high ground south of Thibodaux and ring levee around Morgan City providing a 400-year leve				
Coastal Component:	R1	Nonstructural Component:	None		
Structural Component:	See alternative description above.				

Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	2,476	6,212	254	371	1,081	69	174	13	1
		Mid		8,210	377	585	1,871	111	151	11	1
		Low		9,659	514	715	2,489	142	128	5	1
2	High RSLR High Employment Dispersed Population	High	2,502	6,675	281	469	1,243	88	174	11	1
		Mid		8,582	416	702	2,082	134	151	9	1
		Low		9,943	556	812	2,645	161	128	4	1
3	Low RSLR Business-as-Usual Compact Population	High	2,476	5,489	247	377	1,077	70	174	13	1
		Mid		7,549	368	583	1,860	111	151	11	1
		Low		8,923	497	701	2,441	140	128	5	1
4	High RSLR Business-as-Usual Compact Population	High	2,502	5,846	273	335	1,260	91	174	11	1
		Mid		7,830	402	436	2,069	134	151	9	1
		Low		9,106	532	484	2,619	161	128	4	1

Other Results			Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Construction Time (years)		10	After 50 yrs (% of baseline)	98	97	98	97
Direct Wetland Impacts (acres)		5,300	After 100 yrs (% of baseline)	110	100	110	100
Indirect Impacts (unitless)		-7	Present Value of Life Cycle Costs ($ Millions)				
Spatial Integrity (unitless)		0.37	Coastal Component	23,276	23,703	23,276	23,703
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)	Nonstructural Component	0	0	0	0
	1 / 2	17,073	Structural Component	25,212	25,285	25,212	25,285
	3 / 4	17,073	Total Project	48,488	48,988	48,488	48,988

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 3a
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	
10-year	1,460	403	2,472	729	1,422	392	2,425	764	Structural Plan
100-year	10,629	2,080	15,966	2,668	9,695	2,053	13,659	2,529	GIWW Alt
400-year	22,650	3,483	25,236	3,699	17,848	3,198	19,693	3,353	
1,000-year	26,922	10,993	28,128	11,127	20,766	9,148	21,591	9,227	400-year Design
2,000-year	28,659	11,503	29,317	11,520	21,942	9,600	22,348	9,626	

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels.


Donaldsonville
Napoleonville
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Raceland
Lockport
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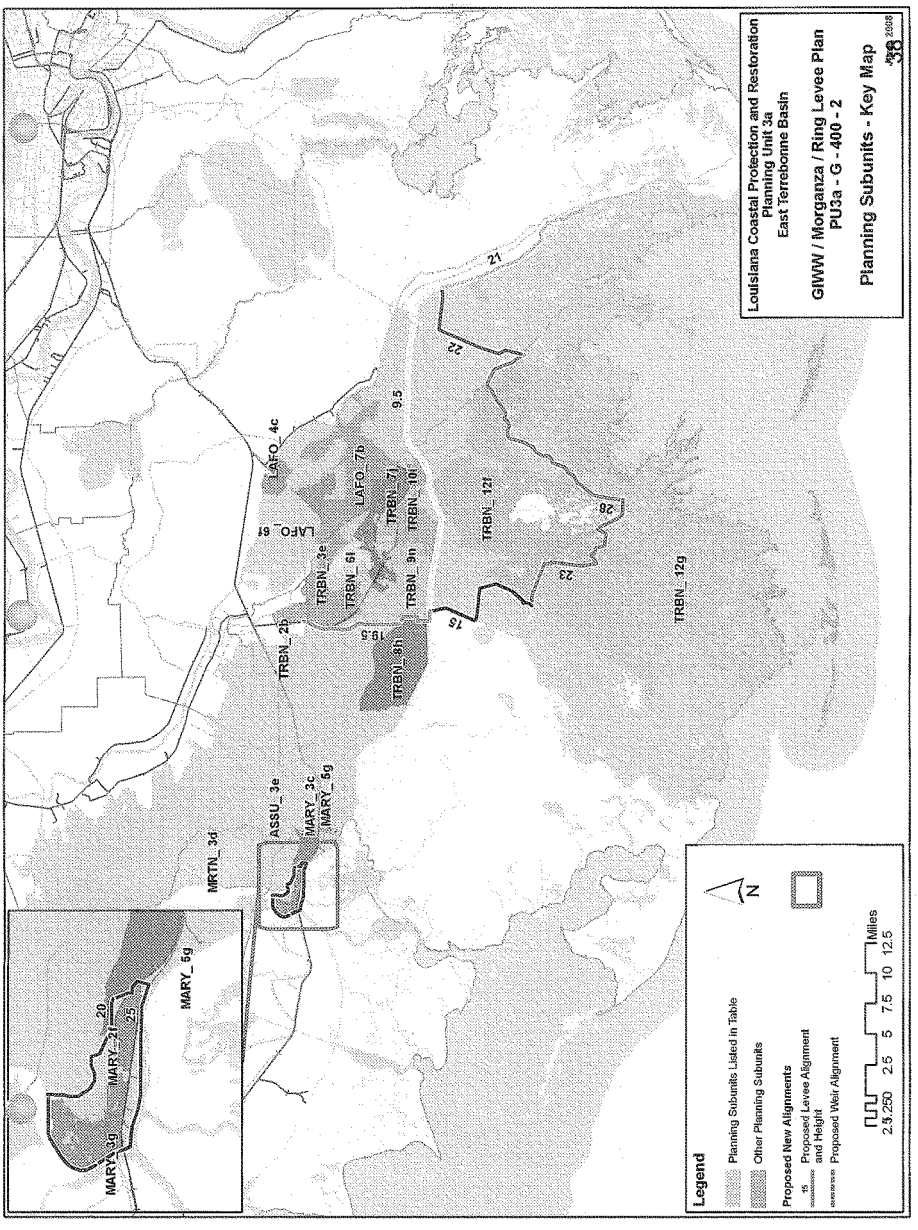
Golden Meadow
Cocodrie
Lake Salvador
Barataria Bay
Lake Barre
Terrebonne Bay
Timbalier Bay
90
Legend
Primary Roads
Planning Unit Boundary
New Levees & Existing Levee Modifications
Morganza Levee (100-Year Design Level)
Larose to Golden Meadow Ring Levee
N
6 3 0 6 12 18 Miles
Louisiana Coastal Protection and Restoration
Planning Unit 3a
Eastern Terrebonne Basin
GIWW/Morganza/Ring Levee Plan
PU3a - G - 400 - 2
(400 - Year Design Level)
November 2007

1911


Louisiana Coastal Protection and Restoration
Planning Unit 3a
East Terrebonne Basin
GIWW / Morganza / Ring Levee Plan
PU3a - G - 400 - 2
Planning Subunits - Key Map
38
Legend
Planning Subunits Listed in Table
Other Planning Subunits
Proposed New Alignments
Proposed Levee Alignment and Height
Proposed Weir Alignment
Miles
2.5 250 2.5 5 7.5 10 12.5
N
LAFO_4c
LAFO_7b
LAFO_6f
TRBN_7j
TRBN_10i
TRBN_3e
TRBN_6l
TRBN_9n
TRBN_2b
TRBN_8h
TRBN_12f
TRBN_12g
ASSU_3e
MARY_3c
MARY_5g
MRTN_3d
MARY_2f
MARY_3g
MARY_5g
9.5
19.5
21
22
23
28
15
20
25

Alternative: PU3a-G-400-2

Water Surface Elevations (feet - NAVD88 2004.65)

Planning Sub Unit	2010 (Base) Conditions						2060 (Future) Conditions					
	100-yr Event		400-year Event		1,000-yr Event		100-yr Event		400-year Event		1,000-yr Event	
	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project
ASSU_3e	3.7	4.4	3.9	4.6	4.3	5.0	6.9	7.6	7.1	7.8	7.5	8.2
LAFO_4c	7.0	1.3	11.7	1.4	13.6	9.5	10.2	1.3	14.9	1.4	16.8	9.5
LAFO_6f	8.4	1.3	13.4	1.4	16.7	9.5	11.6	1.3	16.6	1.4	19.9	9.5
LAFO_7b	7.8	1.3	11.5	1.4	13.6	9.5	11.0	1.3	14.7	1.4	16.8	9.5
MARY_2f	6.3	0.8	8.5	1.3	9.9	2.8	9.5	0.8	11.7	1.3	13.1	2.8
MARY_3c	6.3	7.0	10.8	11.5	13.1	13.9	9.5	10.2	14.0	14.7	16.3	17.1
MARY_3g	6.1	0.8	9.6	1.3	11.4	2.8	9.3	0.8	12.8	1.3	14.6	2.8
MARY_5g	7.8	8.5	9.9	10.6	12.0	12.7	11.0	11.7	13.1	13.8	15.2	15.9
MRTN_3d	3.8	4.5	5.9	6.6	7.1	7.8	7.0	7.7	9.1	9.8	10.3	11.0
TRBN_10i	11.2	1.3	16.1	1.4	19.5	9.5	14.4	1.3	19.3	1.4	22.7	9.5
TRBN_12f	13.5	1.0	18.0	6.6	20.8	15.0	16.7	1.0	21.2	6.6	24.0	15.0
TRBN_12g	13.2	14.7	16.9	18.9	19.0	21.3	16.1	17.9	19.6	22.1	21.8	24.5
TRBN_2b	6.6	1.3	9.5	1.4	12.8	9.5	9.8	1.3	12.7	1.4	16.0	9.5
TRBN_3e	4.9	1.3	8.8	1.4	11.7	9.5	8.1	1.3	12.0	1.4	14.9	9.5
TRBN_6l	7.8	1.3	8.8	1.4	10.5	9.5	11.0	1.3	12.0	1.4	13.7	9.5
TRBN_7j	9.3	1.3	14.0	1.4	16.3	9.5	12.5	1.3	17.2	1.4	19.5	9.5
TRBN_8h	9.7	9.9	14.5	14.8	17.4	17.7	14.3	13.1	18.7	18.0	20.7	20.9
TRBN_9n	8.4	1.3	12.1	1.4	14.1	9.5	11.6	1.3	15.3	1.4	17.3	9.5
Evaluation Parameters	Confidence Level:			90%		Levee Design:			No Friction Waves			
	Future Relative Sea Level Rise:			3.2 feet		Levee Overtopping:			No Friction Waves			

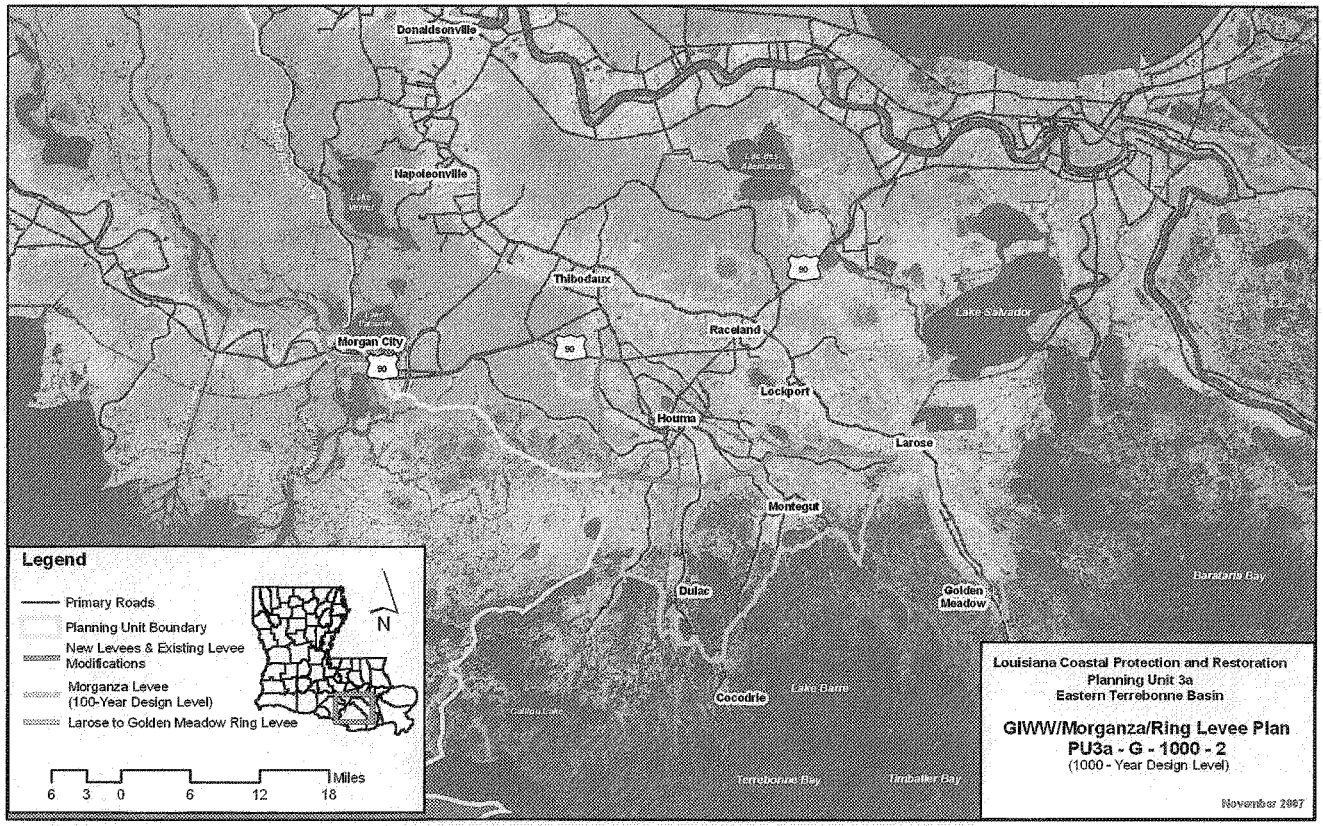
Planning Un	3a	Alt. No.:	PU[illegible]-1000-2	Category:	Coastal Restoration + Structur[illegible]easures
Alternative Description:	Sustain coastal landscape through restoration. Construct Morganza to the Gulf levee at the 100-year design level and a second levee along the GIWW with tieback to high ground south of Thibodaux and ring levee around Morgan City providing a 1000-year leve				
Coastal Component:	R1		Nonstructural Component:		None
Structural Component:	See alternative description above.				

Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	2,599	6,050	246	358	1,036	66	174	17	1
		Mid		8,047	370	572	1,826	108	151	16	1
		Low		9,493	506	703	2,442	139	128	16	1
2	High RSLR High Employment Dispersed Population	High	2,625	6,512	274	456	1,199	85	174	16	1
		Mid		8,419	408	690	2,038	131	151	16	1
		Low		9,778	548	799	2,599	158	128	16	1
3	Low RSLR Business-as-Usual Compact Population	High	2,599	5,339	240	365	1,034	67	174	17	1
		Mid		7,399	361	570	1,817	108	151	16	1
		Low		8,768	490	688	2,397	137	128	16	1
4	High RSLR Business-as-Usual Compact Population	High	2,625	5,696	267	323	1,218	88	174	16	1
		Mid		7,680	396	424	2,026	132	151	16	1
		Low		8,951	525	472	2,575	158	128	16	1

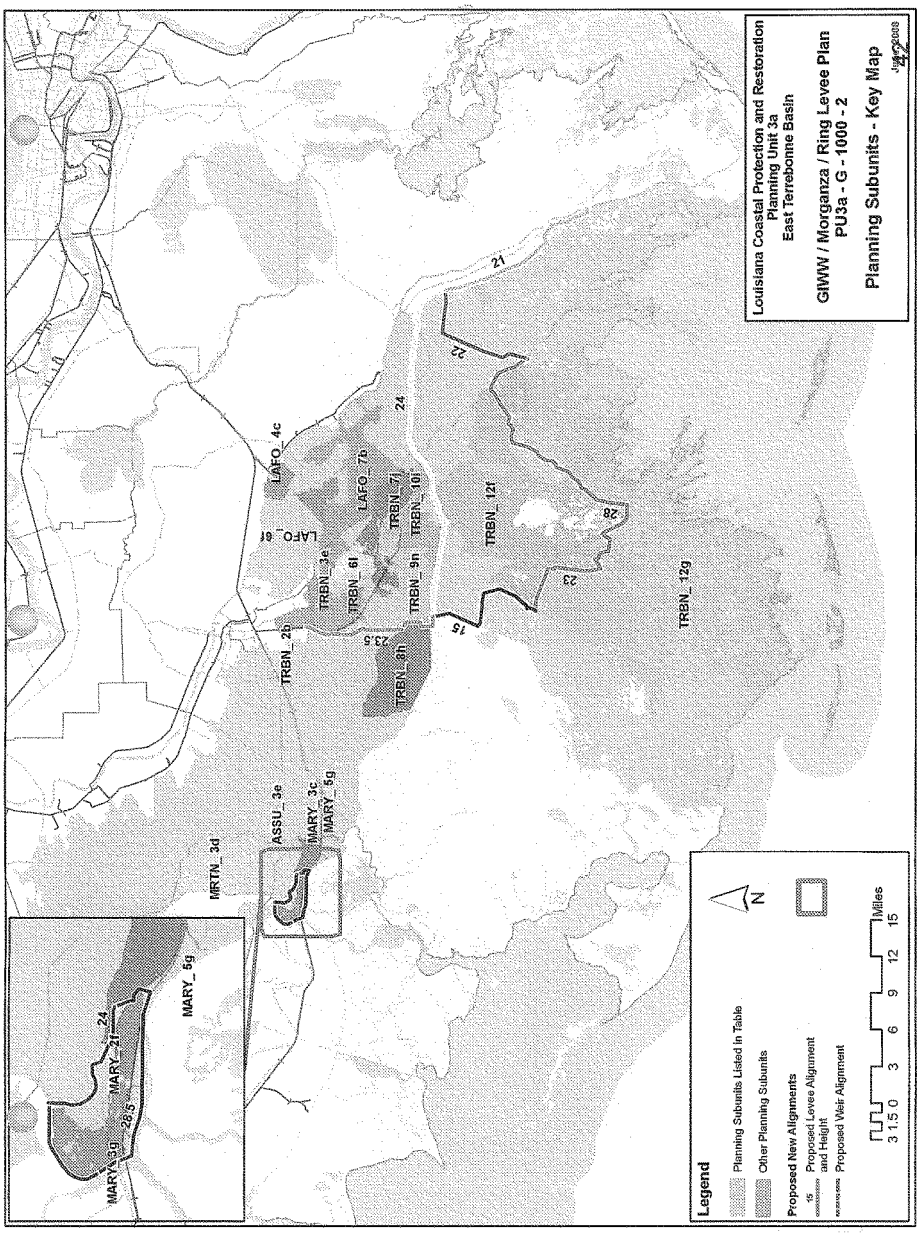
Other Results			Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Construction Time (years)		10	After 50 yrs (% of baseline)	98	97	98	97
Direct Wetland Impacts (acres)		6,600	After 100 yrs (% of baseline)	110	100	110	100
Indirect Impacts (unitless)		-7	Present Value of Life Cycle Costs ($ Millions)				
Spatial Integrity (unitless)		0.37	Coastal Component	23,276	23,703	23,276	23,703
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)	Nonstructural Component	0	0	0	0
	1 / 2	17,926	Structural Component	27,625	27,703	27,625	27,703
	3 / 4	17,926	Total Project	50,901	51,406	50,901	51,406

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 3a
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		Structural Plan
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	GIWW Alt
10-year	1,460	403	2,472	729	1,422	392	2,425	764	1000-year Design
100-year	10,629	2,080	15,966	2,668	9,695	2,053	13,659	2,529	
400-year	22,650	3,476	25,236	3,692	17,848	3,192	19,693	3,346	
1,000-year	26,922	5,200	28,128	5,335	20,766	4,661	21,591	4,741	
2,000-year	28,659	5,655	29,317	5,672	21,942	5,035	22,348	5,060	

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels.


Donaldsonville
Napoleonville
Thibodaux
Raceland
Morgan City
Lockport
Houma
Larose
Montegut
Dulac
Golden Meadow
Cocodrie
Lake Salvador
Lake Decade
Lake Barre
Terrebonne Bay
Timbalier Bay
Barataria Bay
90
Legend
Primary Roads
Planning Unit Boundary
New Levees & Existing Levee Modifications
Morganza Levee (100-Year Design Level)
Larose to Golden Meadow Ring Levee
N
Miles
6 3 0 6 12 18
Louisiana Coastal Protection and Restoration
Planning Unit 3a
Eastern Terrebonne Basin
GIWW/Morganza/Ring Levee Plan
PU3a - G - 1000 - 2
(1000 - Year Design Level)
November 2007

1915


Louisiana Coastal Protection and Restoration
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PU3a - G - 1000 - 2
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Proposed Weir Alignment
Miles
3 1.5 0 3 6 9 12 15
N
LAFO_4c
LAFO_6f
LAFO_7b
TRBN_7j
TRBN_10i
TRBN_12f
TRBN_12g
TRBN_3e
TRBN_6l
TRBN_9n
TRBN_2b
TRBN_8h
ASSU_3e
MARY_3c
MARY_5g
MRTN_3d
MARY_3g
MARY_2f
21
22
23
24
28
15
23.5
28.5

Alternative: PU3a-G-1000-2

Water Surface Elevations (feet - NAVD88 2004.65)

Planning Sub Unit	2010 (Base) Conditions						2060 (Future) Conditions					
	100-yr Event		400-year Event		1,000-yr Event		100-yr Event		400-year Event		1,000-yr Event	
	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project
ASSU_3e	3.7	4.4	3.9	4.6	4.3	5.0	6.9	7.6	7.1	7.8	7.5	8.2
LAFO_4c	7.0	1.3	11.7	1.3	13.6	1.4	10.2	1.3	14.9	1.3	16.8	1.4
LAFO_6f	8.4	1.3	13.4	1.3	16.7	1.4	11.6	1.3	16.6	1.3	19.9	1.4
LAFO_7b	7.8	1.3	11.5	1.3	13.6	1.4	11.0	1.3	14.7	1.3	16.8	1.4
MARY_2f	6.3	0.8	8.5	0.9	9.9	1.3	9.5	0.8	11.7	0.9	13.1	1.3
MARY_3c	6.3	7.0	10.8	11.5	13.1	13.9	9.5	10.2	14.0	14.7	16.3	17.1
MARY_3g	6.1	0.8	9.6	0.9	11.4	1.3	9.3	0.8	12.8	0.9	14.6	1.3
MARY_5g	7.8	8.5	9.9	10.6	12.0	12.7	11.0	11.7	13.1	13.8	15.2	15.9
MRTN_3d	3.8	4.5	5.9	6.6	7.1	7.8	7.0	7.7	9.1	9.8	10.3	11.0
TRBN_10i	11.2	1.3	16.1	1.3	19.5	1.4	14.4	1.3	19.3	1.3	22.7	1.4
TRBN_12f	13.5	1.0	18.0	6.6	20.8	15.0	16.7	1.0	21.2	6.6	24.0	15.0
TRBN_12g	13.2	14.7	16.9	18.9	19.0	21.3	16.1	17.9	19.6	22.1	21.8	24.5
TRBN_2b	6.6	1.3	9.5	1.3	12.8	1.4	9.8	1.3	12.7	1.3	16.0	1.4
TRBN_3e	4.9	1.3	8.8	1.3	11.7	1.4	8.1	1.3	12.0	1.3	14.9	1.4
TRBN_6l	7.8	1.3	8.8	1.3	10.5	1.4	11.0	1.3	12.0	1.3	13.7	1.4
TRBN_7j	9.3	1.3	14.0	1.3	16.3	1.4	12.5	1.3	17.2	1.3	19.5	1.4
TRBN_8h	9.7	9.9	14.5	14.8	17.4	17.7	14.3	13.1	18.7	18.0	20.7	20.9
TRBN_9n	8.4	1.3	12.1	1.3	14.1	1.4	11.6	1.3	15.3	1.3	17.3	1.4

Evaluation Parameters				
	Confidence Level:	90%	Levee Design:	No Friction Waves
	Future Relative Sea Level Rise:	3.2 feet	Levee Overtopping:	No Friction Waves

1917

Planning Unit:	3a	Alt. No.:	PU3a-M-100-1	Category:	Comprehensive (Coastal+Structural+Nonstructural)
Alternative Description:	Comprehensive plan--Same coastal and structural measures as Alternative PU3a-M-100-1 but with complementary nonstructural measures to reduce residual risk.				
Coastal Component:	R1		Nonstructural Component:		100-yr complementary measures
Structural Component:	Same as Alternative PU3a-M-100-1				

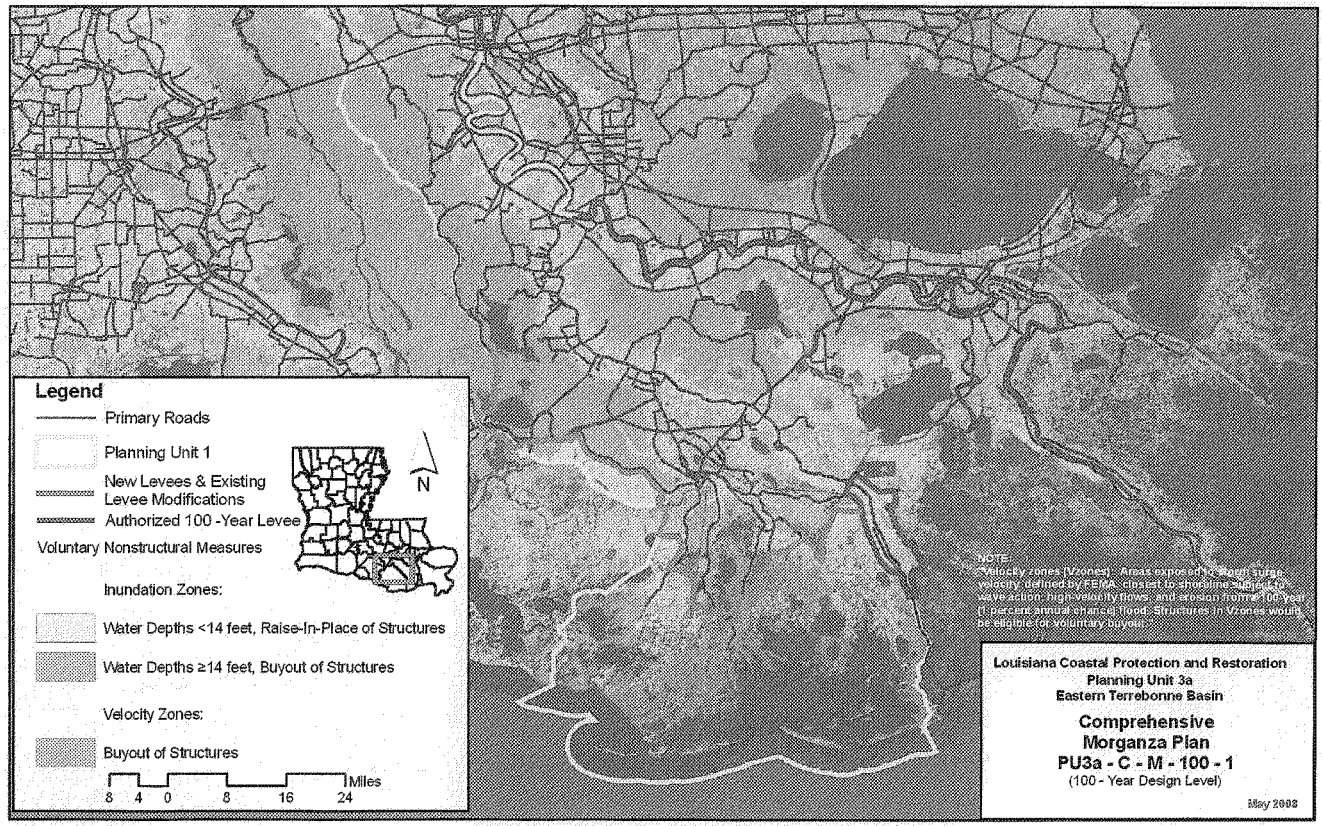
Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	2,314	5,906	191	304	933	57	203	18	1
		Mid		7,646	296	517	1,718	99	180	17	1
		Low		9,095	426	651	2,332	130	157	13	0
2	High RSLR High Employment Dispersed Population	High	2,362	6,153	207	384	1,075	73	203	18	1
		Mid		7,866	320	616	1,903	118	180	14	1
		Low		9,273	455	732	2,466	145	157	8	0
3	Low RSLR Business-as-Usual Compact Population	High	2,314	5,238	188	310	937	58	203	18	1
		Mid		7,030	289	511	1,711	99	180	17	1
		Low		8,377	409	632	2,290	127	157	13	0
4	High RSLR Business-as-Usual Compact Population	High	2,362	5,422	202	247	1,097	76	203	18	1
		Mid		7,187	309	345	1,892	118	180	14	1
		Low		8,496	432	396	2,442	144	157	8	0

Other Results		
Construction Time (years)		10
Direct Wetland Impacts (acres)		4,900
Indirect Impacts (unitless)		-7
Spatial Integrity (unitless)		0.37
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)
	1 / 2	16,012
	3 / 4	16,009

Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
After 50 yrs (% of baseline)	98	97	98	97
After 100 yrs (% of baseline)	110	100	110	100
Present Value of Life Cycle Costs ($ Millions)				
Coastal Component	23,276	23,703	23,276	23,703
Nonstructural Component	631	631	623	623
Structural Component	21,412	21,928	21,412	21,928
Total Project	45,319	46,262	45,311	46,254

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 3a
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		Comprehensive Plan
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	Morganza Alt
10-year	1,460	107	2,472	162	1,422	99	2,425	162	100-year Design
100-year	10,629	422	15,966	614	9,695	434	13,659	593	
400-year	22,650	1,852	25,236	1,934	17,848	1,752	19,693	1,830	
1,000-year	26,922	15,182	28,128	15,207	20,766	12,875	21,591	12,896	
2,000-year	28,659	20,184	29,317	20,196	21,942	16,613	22,348	16,623	

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels.


Legend
Primary Roads
Planning Unit 1
New Levees & Existing Levee Modifications
Authorized 100 -Year Levee
Voluntary Nonstructural Measures
Inundation Zones:
Water Depths <14 feet, Raise-In-Place of Structures
Water Depths ≥14 feet, Buyout of Structures
Velocity Zones:
Buyout of Structures
8 4 0 8 16 24 Miles
N
NOTE:
Velocity zones (Vzones): Areas exposed to storm surge velocity, defined by FEMA, closest to shoreline subject to wave action, high-velocity flows, and erosion from a 100-year (1-percent annual chance) flood. Structures in Vzones would be eligible for voluntary buyout.
Louisiana Coastal Protection and Restoration
Planning Unit 3a
Eastern Terrebonne Basin
Comprehensive
Morganza Plan
PU3a - C - M - 100 - 1
(100 - Year Design Level)
May 2008

1919

Planning Unit:	3a	Alt. No.:	PU3a-M-100-2	Category:	Comprehensive (Coastal+Structural+Nonstructural)
Alternative Description:	Comprehensive plan--Same coastal and structural measures as Alternative PU3a-M-100-2 but with complementary nonstructural measures to reduce residual risk.				
Coastal Component:	R1			Nonstructural Component:	100-yr complementary measures
Structural Component:	Same as Alternative PU3a-M-100-2				

Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	2,193	6,042	196	321	942	61	174	17	1
		Mid		8,171	322	549	1,775	106	151	14	1
		Low		9,925	483	717	2,490	143	128	10	0
2	High RSLR High Employment Dispersed Population	High	2,221	6,504	224	420	1,118	81	174	15	1
		Mid		8,542	361	667	1,986	129	151	11	0
		Low		10,209	526	810	2,646	161	128	8	0
3	Low RSLR Business-as-Usual Compact Population	High	2,193	5,330	193	332	948	62	174	17	1
		Mid		7,496	315	551	1,773	106	151	14	1
		Low		9,137	466	704	2,449	141	128	10	0
4	High RSLR Business-as-Usual Compact Population	High	2,221	5,687	218	292	1,147	85	174	15	1
		Mid		7,777	350	405	1,981	130	151	11	0
		Low		9,320	502	484	2,626	162	128	8	0

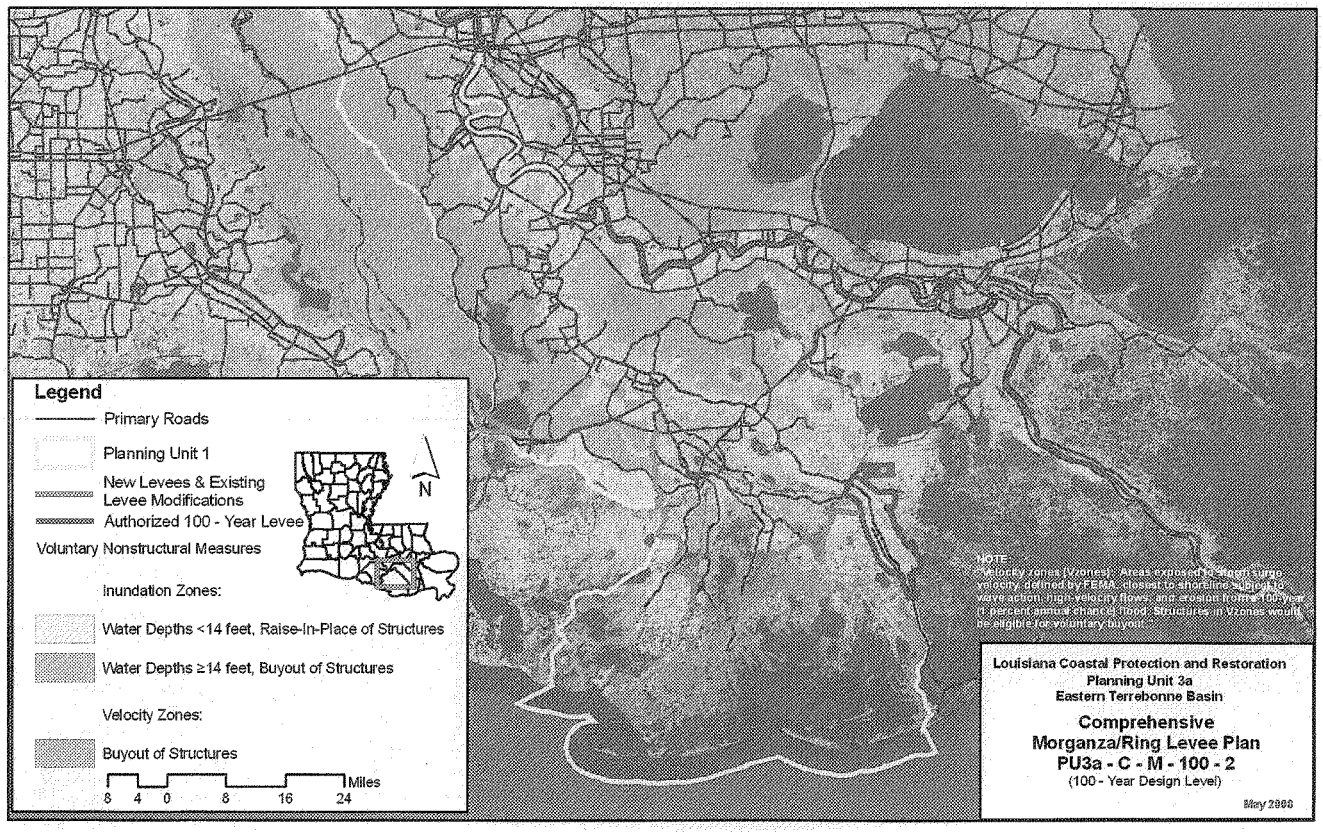
Other Results	
Construction Time (years)	10
Direct Wetland Impacts (acres)	4,200
Indirect Impacts (unitless)	-4
Spatial Integrity (unitless)	0.37

Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)	
	1 / 2	15,217	15,407
	3 / 4	15,215	15,405

Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
After 50 yrs (% of baseline)	98	97	98	97
After 100 yrs (% of baseline)	110	100	110	100
Present Value of Life Cycle Costs ($ Millions)				
Coastal Component	23,276	23,703	23,276	23,703
Nonstructural Component	695	695	689	689
Structural Component	18,983	19,098	18,983	19,098
Total Project	42,954	43,496	42,947	43,490

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 3a
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		Comprehensive Plan
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	Morganza Alt
10-year	1,460	152	2,472	423	1,422	153	2,425	472	100-year Design
100-year	10,629	1,548	15,966	2,236	9,695	1,550	13,659	2,129	
400-year	22,650	5,133	25,236	5,406	17,848	4,777	19,693	4,985	
1,000-year	26,922	20,469	28,128	20,631	20,766	16,774	21,591	16,877	
2,000-year	28,659	20,694	29,317	20,723	21,942	16,944	22,348	16,980	

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels.


Legend
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Planning Unit 1
New Levees & Existing Levee Modifications
Authorized 100 - Year Levee
Voluntary Nonstructural Measures
Inundation Zones:
Water Depths <14 feet, Raise-In-Place of Structures
Water Depths ≥14 feet, Buyout of Structures
Velocity Zones:
Buyout of Structures
Miles
8 4 0 8 16 24
N
NOTE:
Louisiana Coastal Protection and Restoration
Planning Unit 3a
Eastern Terrebonne Basin
Comprehensive
Morganza/Ring Levee Plan
PU3a - C - M - 100 - 2
(100 - Year Design Level)
May 2008

1921

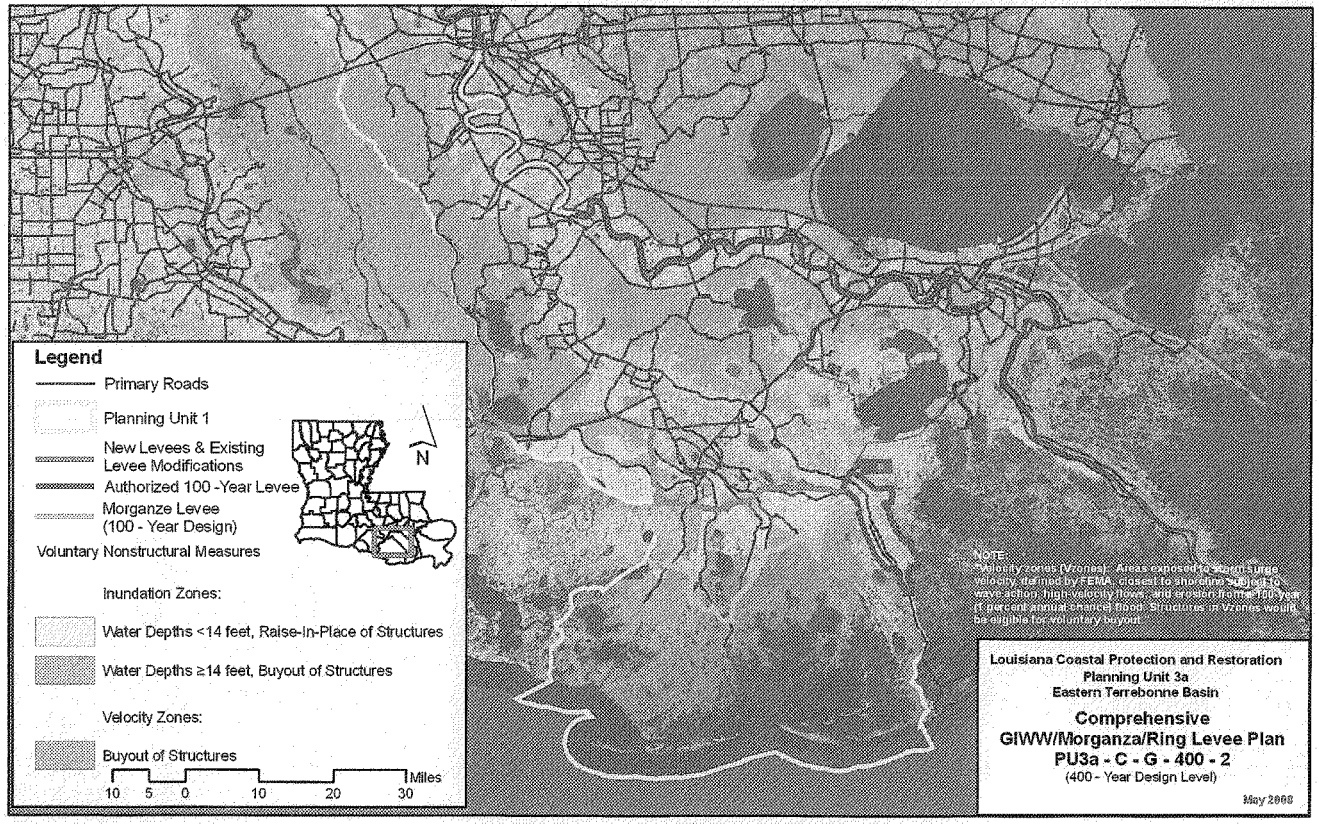
Planning Unit:	3a	Alt. No.:	PU3a-G-400-2	Category:	Comprehensive (Coastal+Structural+Nonstructural)
Alternative Description:	Comprehensive plan--Same coastal and structural measures as Alternative PU3a-G-400-2 but with complementary nonstructural measures to reduce residual risk.				
Coastal Component:	R1			Nonstructural Component:	400-yr complementary measures
Structural Component:	Same as Alternative PU3a-G-400-2				

Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	2,553	5,990	198	274	873	51	174	13	1
		Mid		7,986	311	411	1,412	79	151	11	1
		Low		9,429	434	528	1,938	104	128	5	1
2	High RSLR High Employment Dispersed Population	High	2,579	6,452	223	330	977	62	174	11	1
		Mid		8,358	346	497	1,584	97	151	9	1
		Low		9,714	472	593	2,056	118	128	4	1
3	Low RSLR Business-as-Usual Compact Population	High	2,569	5,275	193	280	874	51	174	13	1
		Mid		7,334	303	412	1,418	79	151	11	1
		Low		8,700	418	520	1,917	103	128	5	1
4	High RSLR Business-as-Usual Compact Population	High	2,595	5,632	216	192	992	64	174	11	1
		Mid		7,615	334	232	1,583	97	151	9	1
		Low		8,884	450	267	2,049	118	128	4	1

Other Results			Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Construction Time (years)		10	After 50 yrs (% of baseline)	98	97	98	97
Direct Wetland Impacts (acres)		5,300	After 100 yrs (% of baseline)	110	100	110	100
Indirect Impacts (unitless)		-7	Present Value of Life Cycle Costs ($ Millions)				
Spatial Integrity (unitless)		0.37	Coastal Component	23,276	23,703	23,276	23,703
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)	Nonstructural Component	1,520	1,520	1,831	1,831
	1 / 2	17,605 17,780	Structural Component	25,212	25,285	25,212	25,285
	3 / 4	17,714 17,889	Total Project	50,008	50,507	50,319	50,818

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 3a
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		Comprehensive Plan
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	GIWW Alt
10-year	1,460	125	2,472	331	1,422	125	2,425	370	400-year Design
100-year	10,629	1,188	15,966	1,628	9,695	1,168	13,659	1,540	
400-year	22,650	2,110	25,236	2,557	17,848	1,917	19,693	2,273	
1,000-year	26,922	9,204	28,128	9,505	20,766	7,400	21,591	7,638	
2,000-year	28,659	9,921	29,317	10,025	21,942	8,048	22,348	8,160	

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels.


Legend
Primary Roads
Planning Unit 1
New Levees & Existing Levee Modifications
Authorized 100 -Year Levee
Morganze Levee (100 - Year Design)
Voluntary Nonstructural Measures
Inundation Zones:
Water Depths <14 feet, Raise-In-Place of Structures
Water Depths ≥14 feet, Buyout of Structures
Velocity Zones:
Buyout of Structures
N
10 5 0 10 20 30 Miles
NOTE:
Louisiana Coastal Protection and Restoration
Planning Unit 3a
Eastern Terrebonne Basin
Comprehensive
GIWW/Morganza/Ring Levee Plan
PU3a - C - G - 400 - 2
(400 - Year Design Level)
May 2008

1923

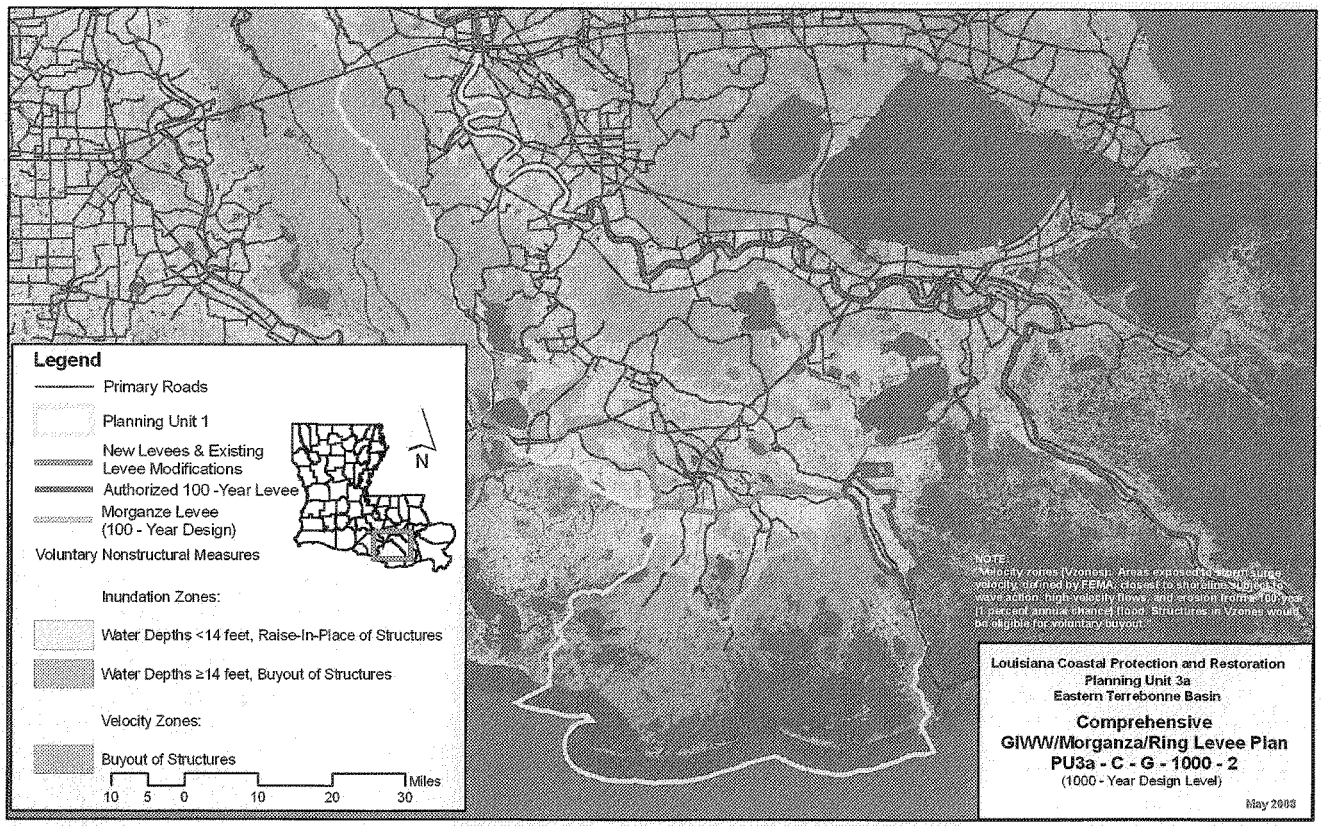
Planning Unit	3a	Alt. No.	PU3a-G-1000-2	Category:	Comprehensive (Coastal+Structural+Nonstructural)
Alternative Description:	Comprehensive plan--Same coastal and structural measures as Alternative PU3a-G-1000-2 but with complementary nonstructural measures to reduce residual risk.				
Coastal Component:	R1		Nonstructural Component:		1000-yr complementary measures
Structural Component:	Same as Alternative PU3a-G-1000-2				

Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	2,727	5,747	189	261	828	48	174	17	1
		Mid		7,742	298	395	1,357	75	151	16	1
		Low		9,168	415	507	1,871	100	128	16	1
2	High RSLR High Employment Dispersed Population	High	2,753	6,210	212	315	927	59	174	16	1
		Mid		8,114	331	472	1,514	91	151	16	1
		Low		9,453	453	568	1,980	112	128	16	1
3	Low RSLR Business-as-Usual Compact Population	High	2,739	5,049	185	265	828	48	174	17	1
		Mid		7,106	291	391	1,361	75	151	16	1
		Low		8,455	400	493	1,843	98	128	16	1
4	High RSLR Business-as-Usual Compact Population	High	2,765	5,405	206	171	939	60	174	16	1
		Mid		7,387	319	204	1,511	91	151	16	1
		Low		8,638	431	239	1,968	112	128	16	1

Other Results			Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Construction Time (years)		10	After 50 yrs (% of baseline)	98	97	98	97
Direct Wetland Impacts (acres)		6,600	After 100 yrs (% of baseline)	110	100	110	100
Indirect Impacts (unitless)		-7	Present Value of Life Cycle Costs ($ Millions)				
Spatial Integrity (unitless)		0.37	Coastal Component	23,276	23,703	23,276	23,703
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)	Nonstructural Component	2,504	2,504	2,745	2,745
	1 / 2	18,802 18,979	Structural Component	27,625	27,703	27,625	27,703
	3 / 4	18,887 19,063	Total Project	53,405	53,909	53,646	54,150

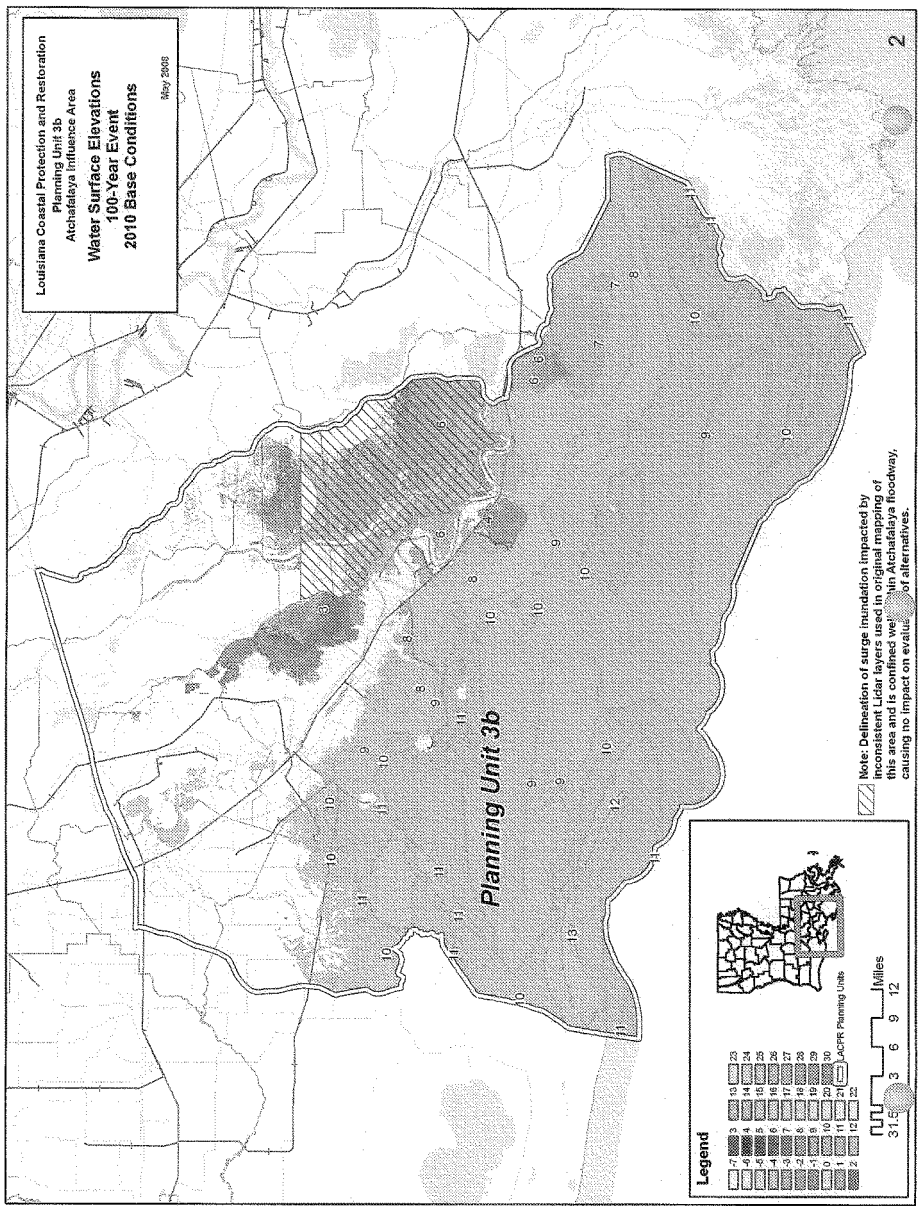
2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 3a
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		Comprehensive Plan
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	GIWW Alt
10-year	1,460	102	2,472	276	1,422	96	2,425	289	1000-year Design
100-year	10,629	977	15,966	1,358	9,695	931	13,659	1,250	
400-year	22,650	1,651	25,236	1,951	17,848	1,438	19,693	1,681	
1,000-year	26,922	2,272	28,128	2,718	20,766	1,853	21,591	2,230	
2,000-year	28,659	3,156	29,317	3,313	21,942	2,627	22,348	2,796	

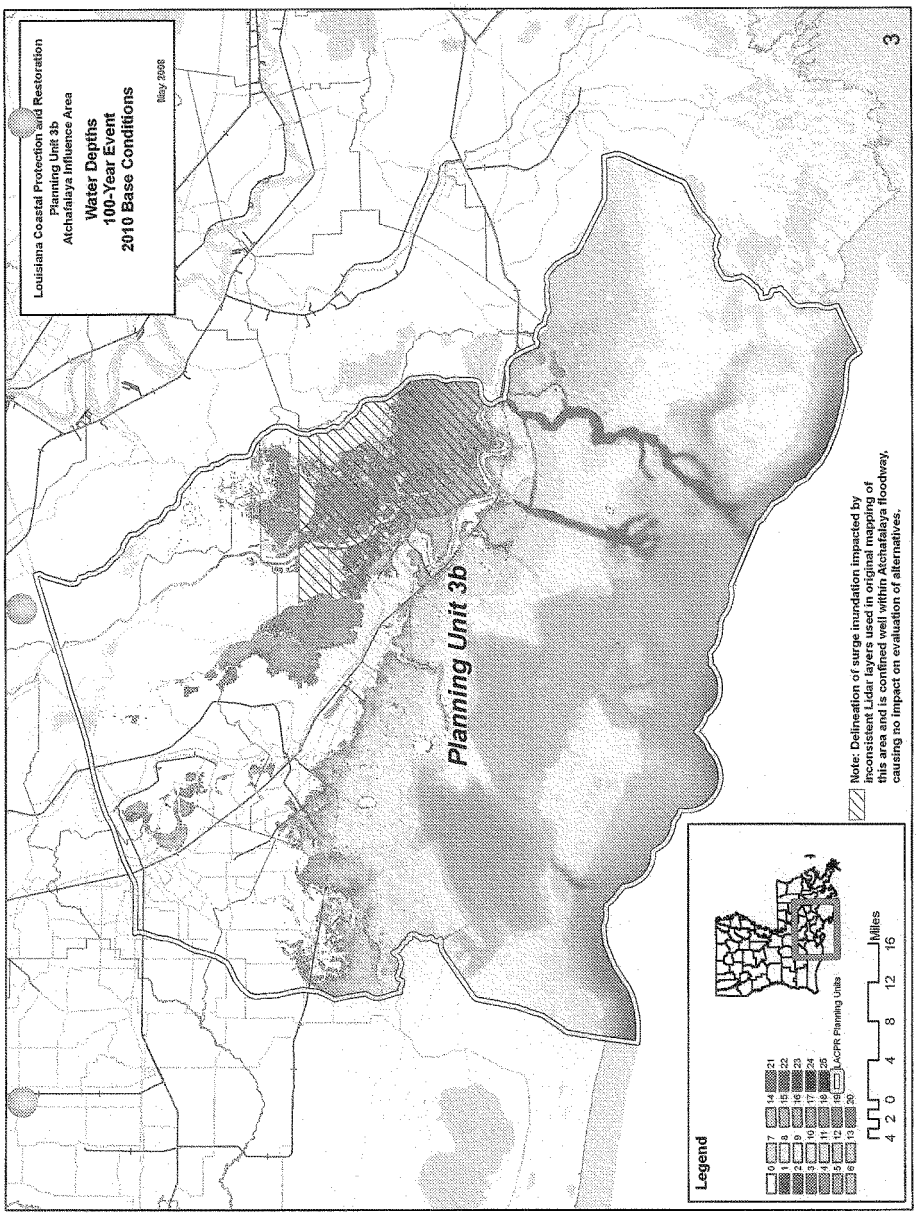
Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels.


Legend
Primary Roads
Planning Unit 1
New Levees & Existing Levee Modifications
Authorized 100 -Year Levee
Morganze Levee (100 - Year Design)
Voluntary Nonstructural Measures
Inundation Zones:
Water Depths <14 feet, Raise-In-Place of Structures
Water Depths ≥14 feet, Buyout of Structures
Velocity Zones:
Buyout of Structures
10 5 0 10 20 30 Miles
N
NOTE:
Velocity zones (Vzones): Areas exposed to storm surge velocity, defined by FEMA, closest to shoreline, subject to wave action, high velocity flows, and erosion from a 100-year (1 percent annual chance) flood. Structures in Vzones would be eligible for voluntary buyout.
Louisiana Coastal Protection and Restoration
Planning Unit 3a
Eastern Terrebonne Basin
Comprehensive
GIWW/Morganza/Ring Levee Plan
PU3a - C - G - 1000 - 2
(1000 - Year Design Level)
May 2008

1925

Planning Unit 3b


Louisiana Coastal Protection and Restoration
Planning Unit 3b
Atchafalaya Influence Area
Water Surface Elevations
100-Year Event
2010 Base Conditions
May 2008
Planning Unit 3b
Legend
CPRA Planning Units
Miles
3 6 9 12
Note: Delineation of surge inundation impacted by inconsistent Lidar layers used in original mapping of this area and is confined within Atchafalaya floodway, causing no impact on evaluation of alternatives.
2


Louisiana Coastal Protection and Restoration
Planning Unit 3b
Atchafalaya Influence Area
Water Depths
100-Year Event
2010 Base Conditions
May 2008
Planning Unit 3b
Legend
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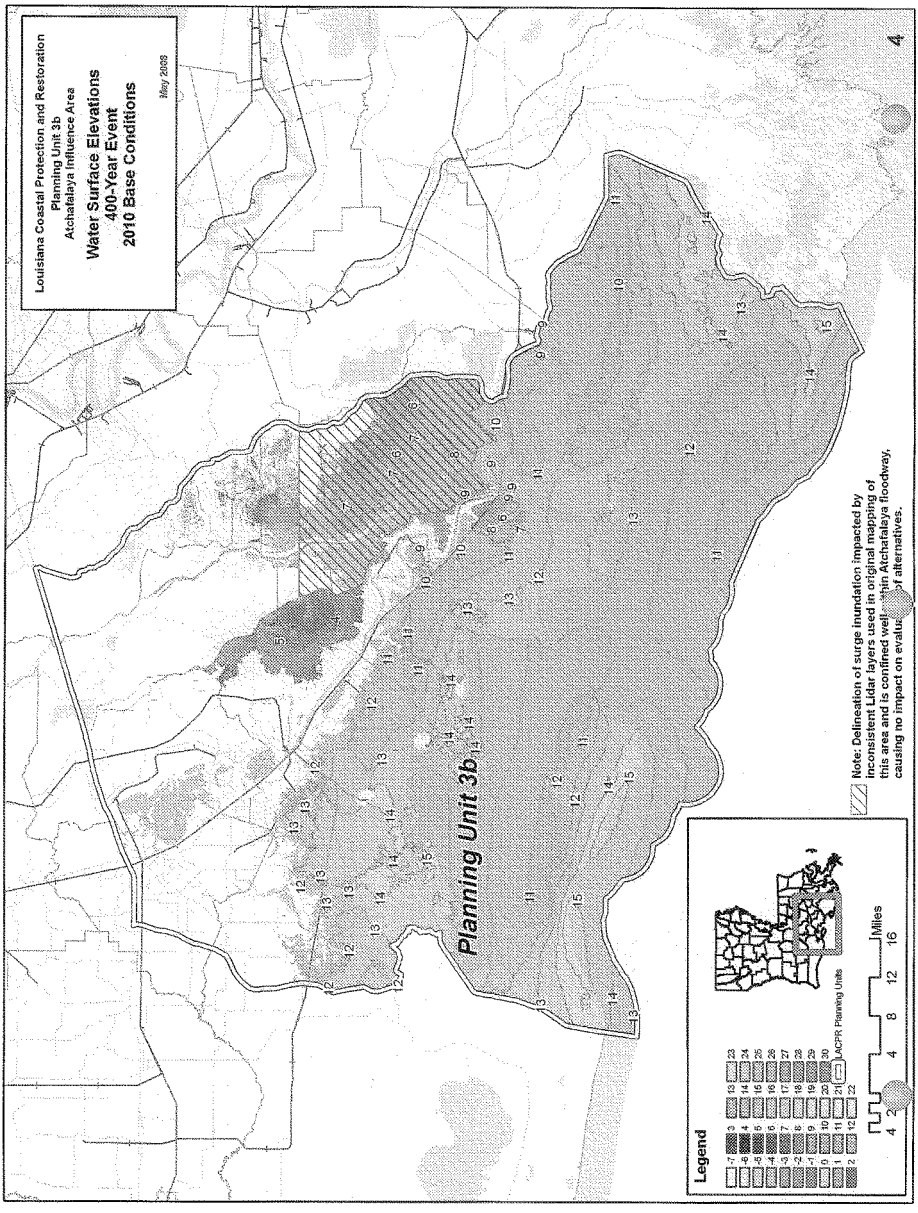
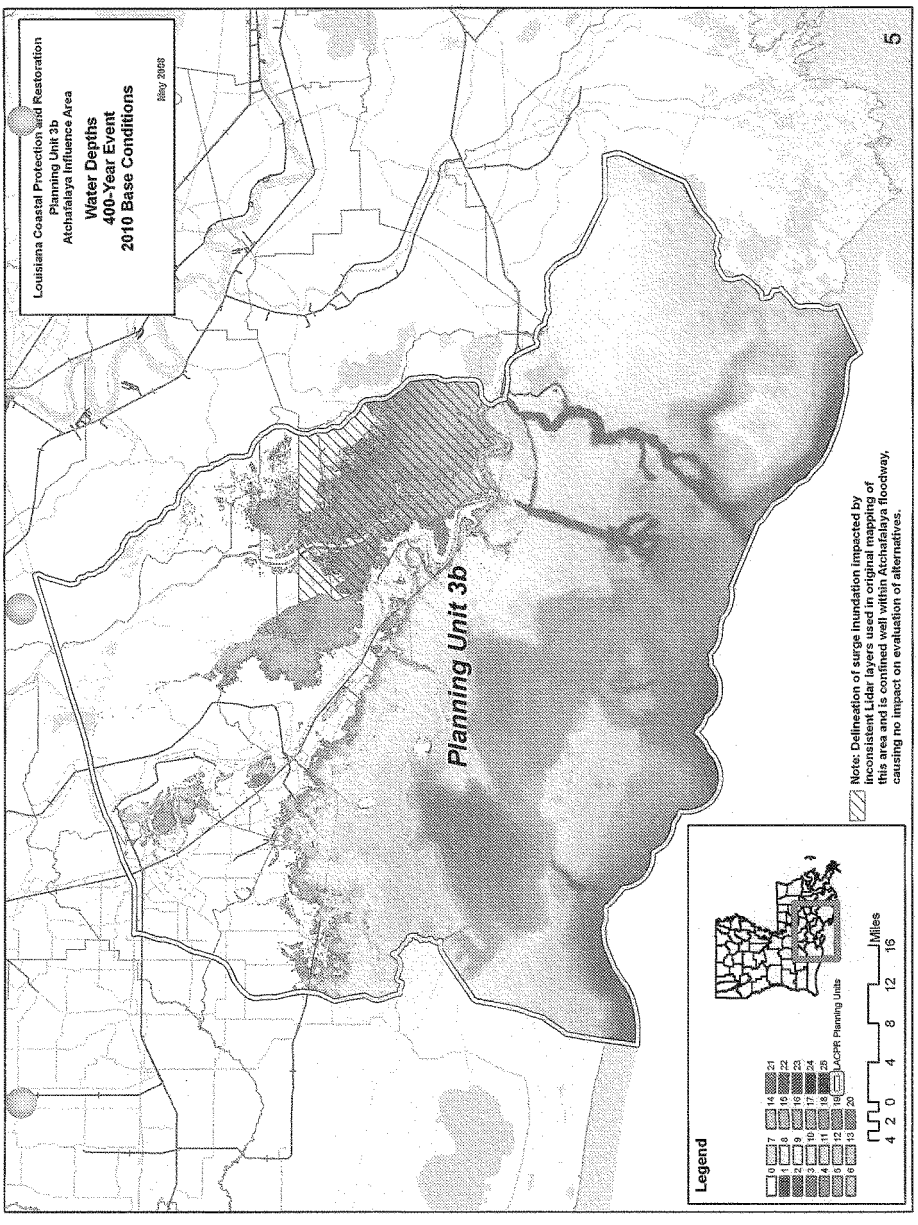
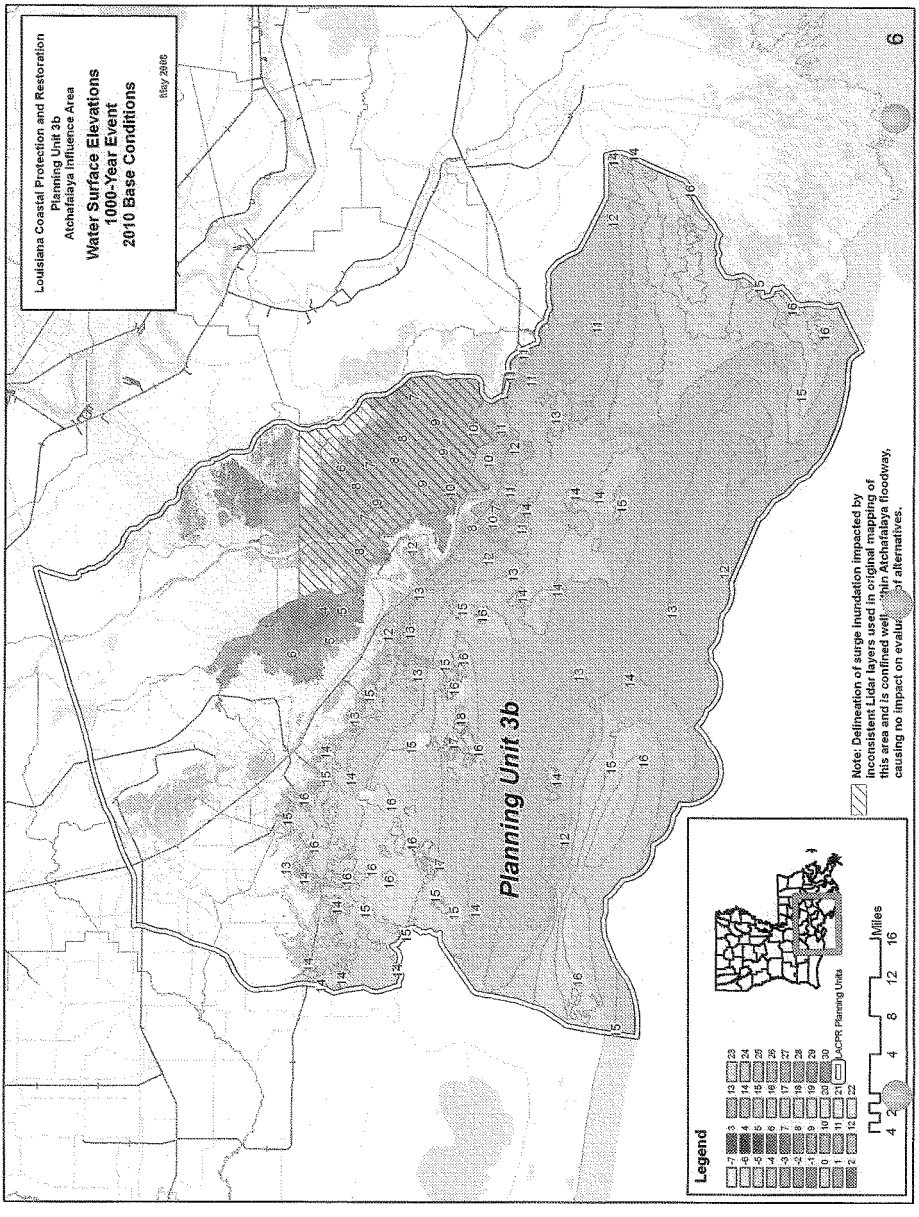
25
LACPR Planning Units
4 2 0 4 8 12 16
Miles
Note: Delineation of surge inundation impacted by inconsistent Lidar layers used in original mapping of this area and is confined well within Atchafalaya floodway, causing no impact on evaluation of alternatives.
3


Louisiana Coastal Protection and Restoration
Planning Unit 3b
Atchafalaya Influence Area
Water Surface Elevations
400-Year Event
2010 Base Conditions
May 2009
Planning Unit 3b
Legend
CPRA Planning Units
Miles
4 2 0 4 8 12 16
Note: Delineation of surge inundation impacted by inconsistent Lidar layers used in original mapping of this area and is confined well within Atchafalaya floodway, causing no impact on evaluation of alternatives.
4


Louisiana Coastal Protection and Restoration
Planning Unit 3b
Atchafalaya Influence Area
Water Depths
400-Year Event
2010 Base Conditions
May 2009
Planning Unit 3b
Legend
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25
LACPR Planning Units
4 2 0 4 8 12 16
Miles
Note: Delineation of surge inundation impacted by inconsistent Lidar layers used in original mapping of this area and is confined well within Atchafalaya floodway, causing no impact on evaluation of alternatives.
5


Louisiana Coastal Protection and Restoration
Planning Unit 3b
Atchafalaya Influence Area
Water Surface Elevations
1000-Year Event
2010 Base Conditions
Planning Unit 3b
Legend
Miles
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Note: Delineation of surge inundation impacted by inconsistent Lidar layers used in original mapping of this area and is confined wel... ...hin Atchafalaya floodway, causing no impact on evalu... ...f alternatives.
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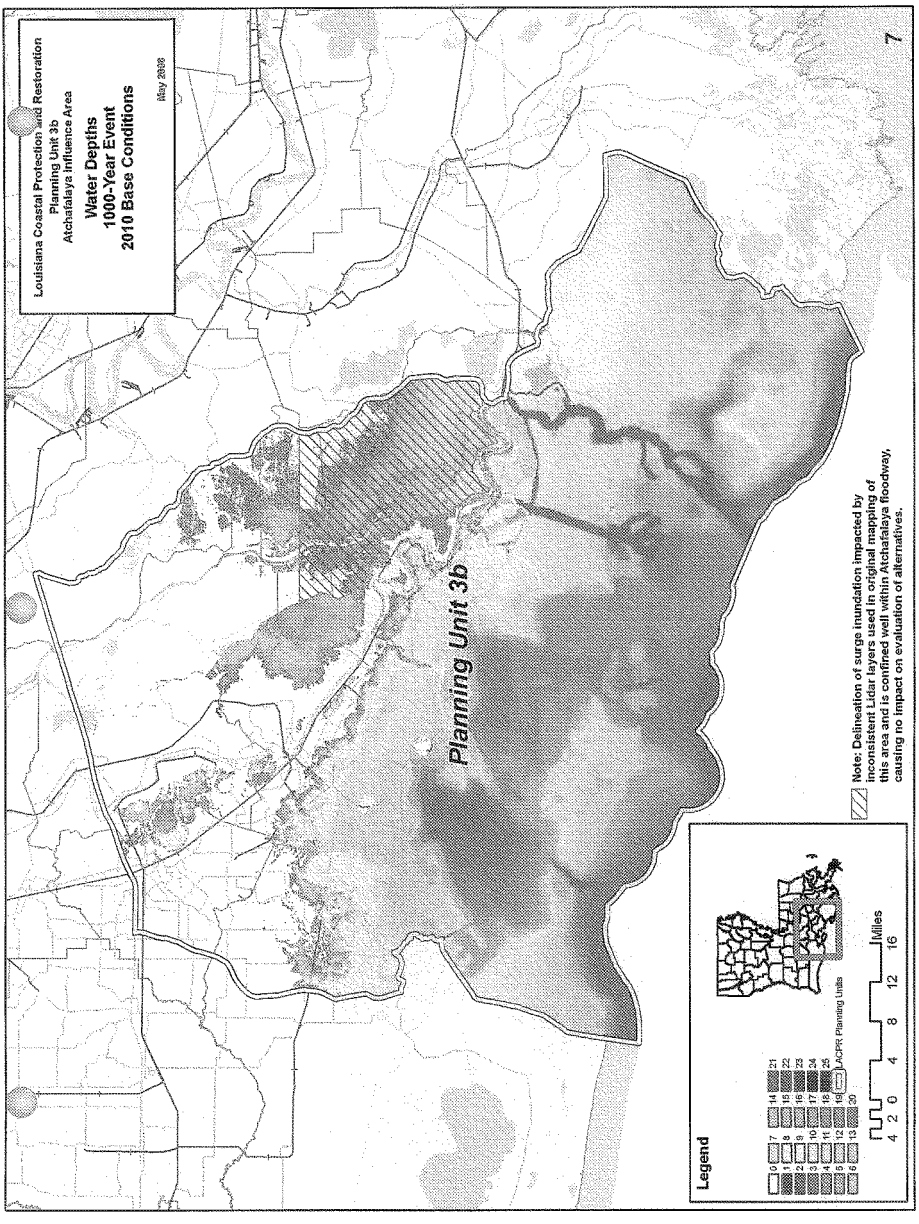
Louisiana Coastal Protection and Restoration
Planning Unit 3b
Atchafalaya Influence Area
Water Depths
1000-Year Event
2010 Base Conditions
May 2006
Planning Unit 3b
Legend
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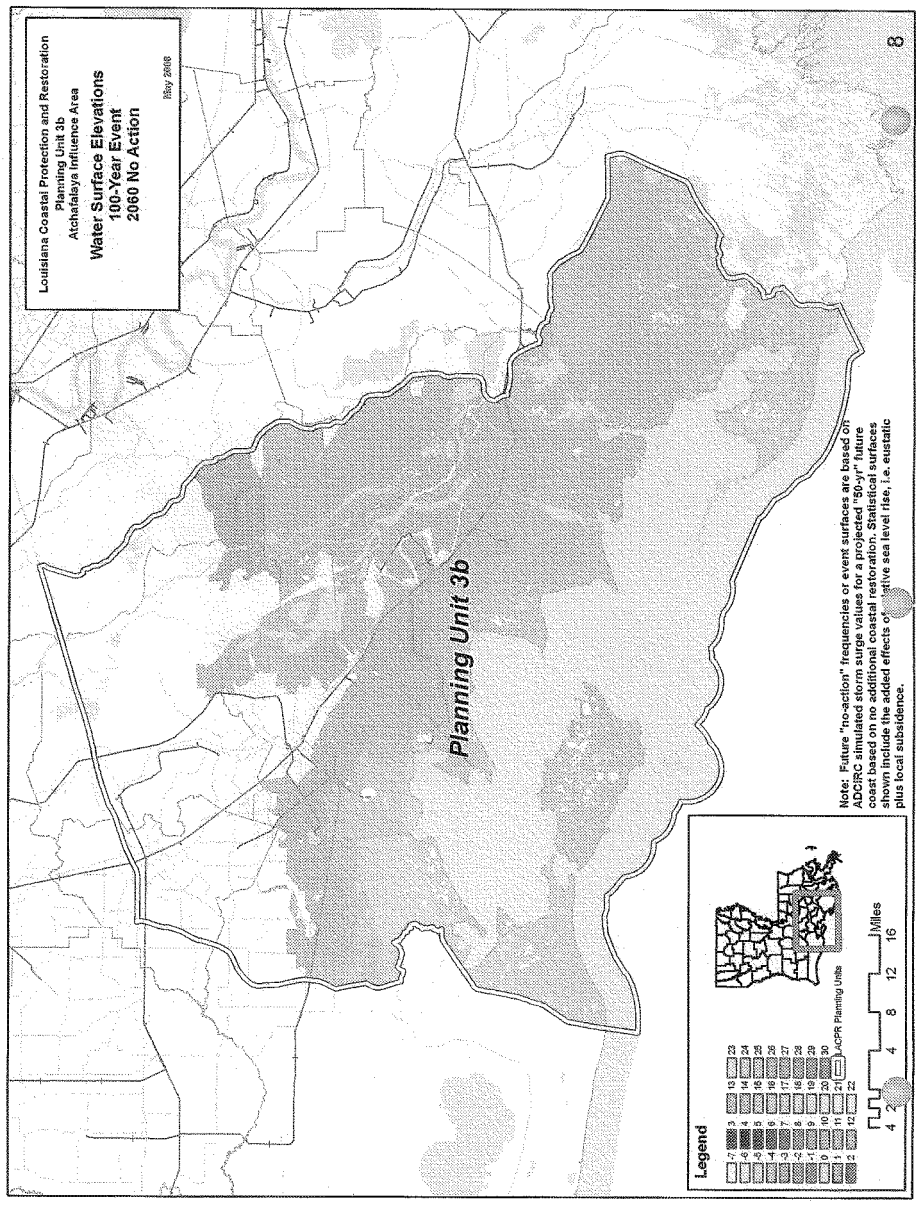
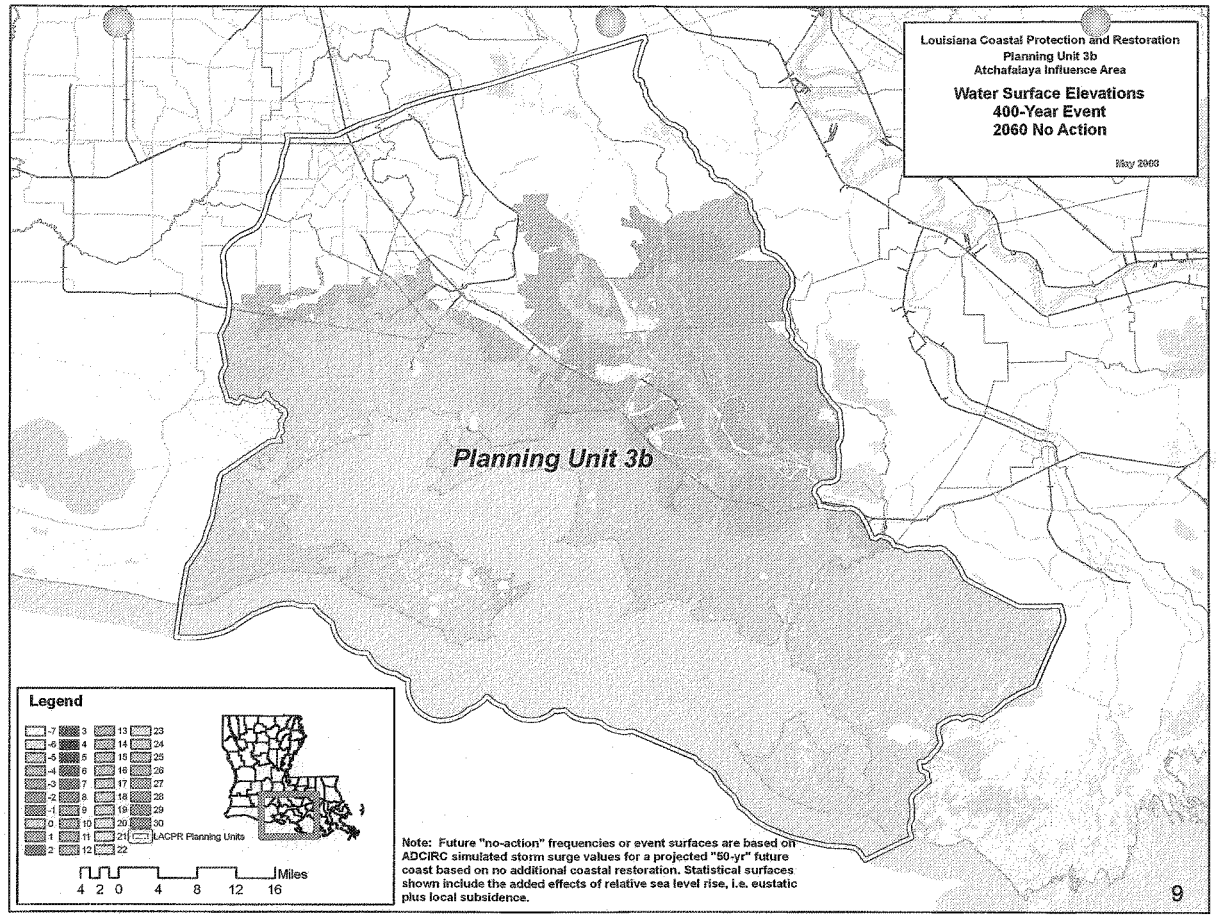
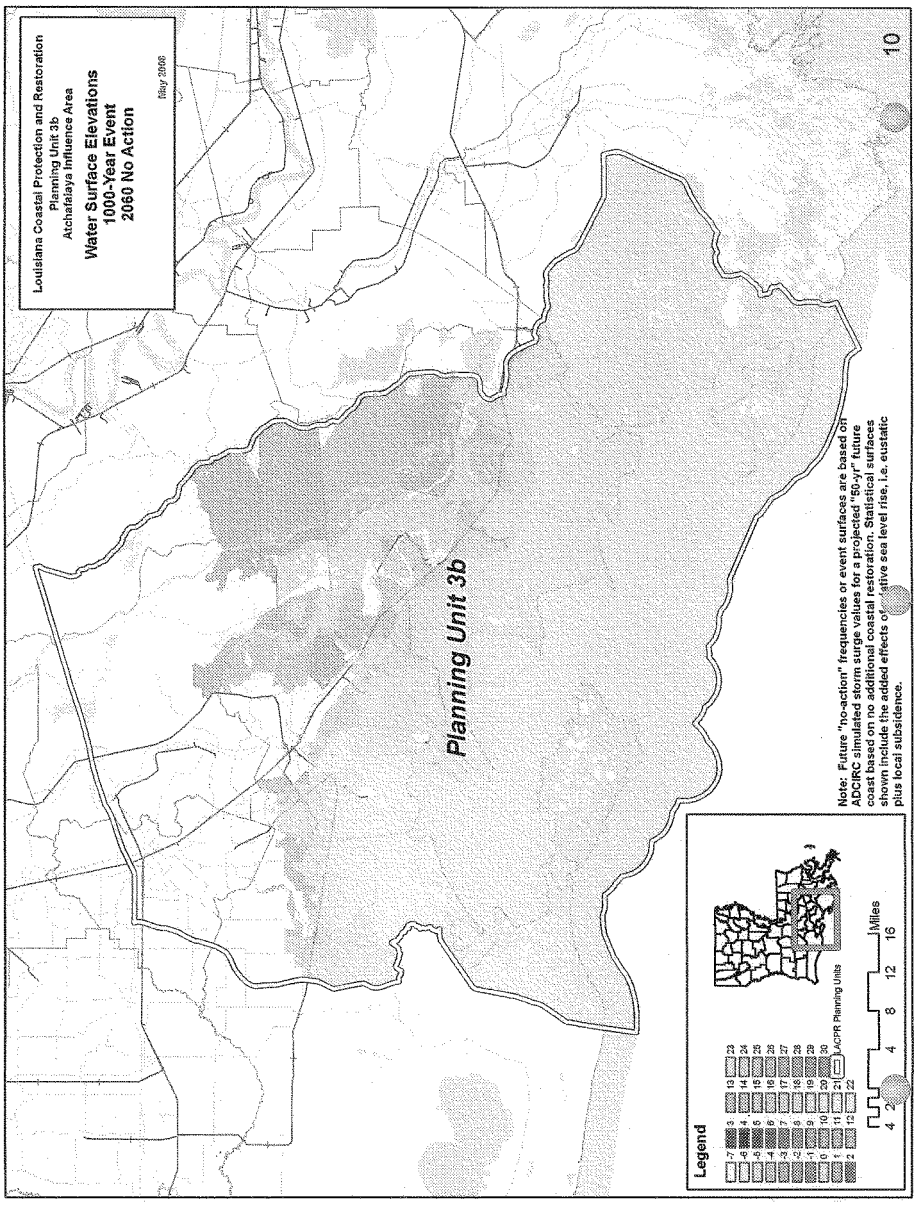
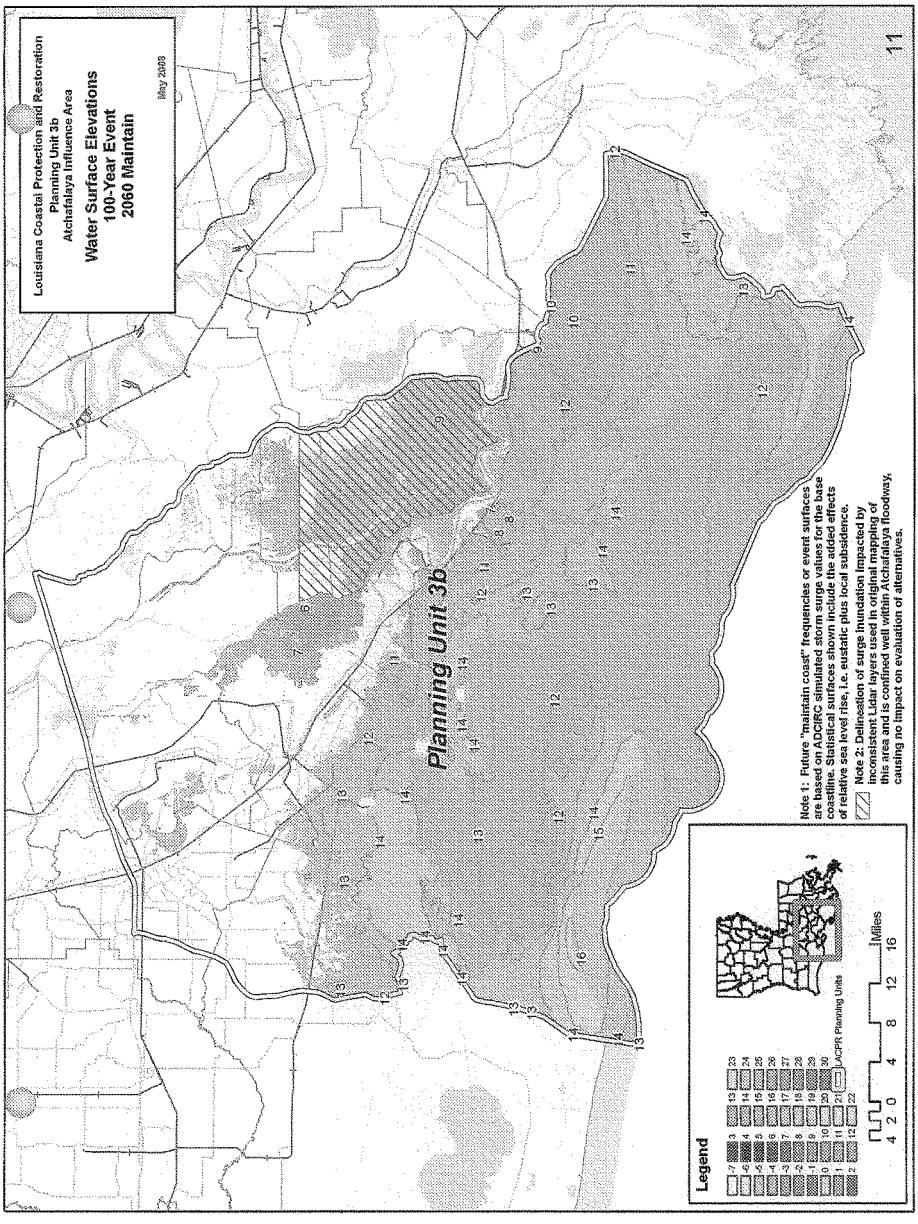
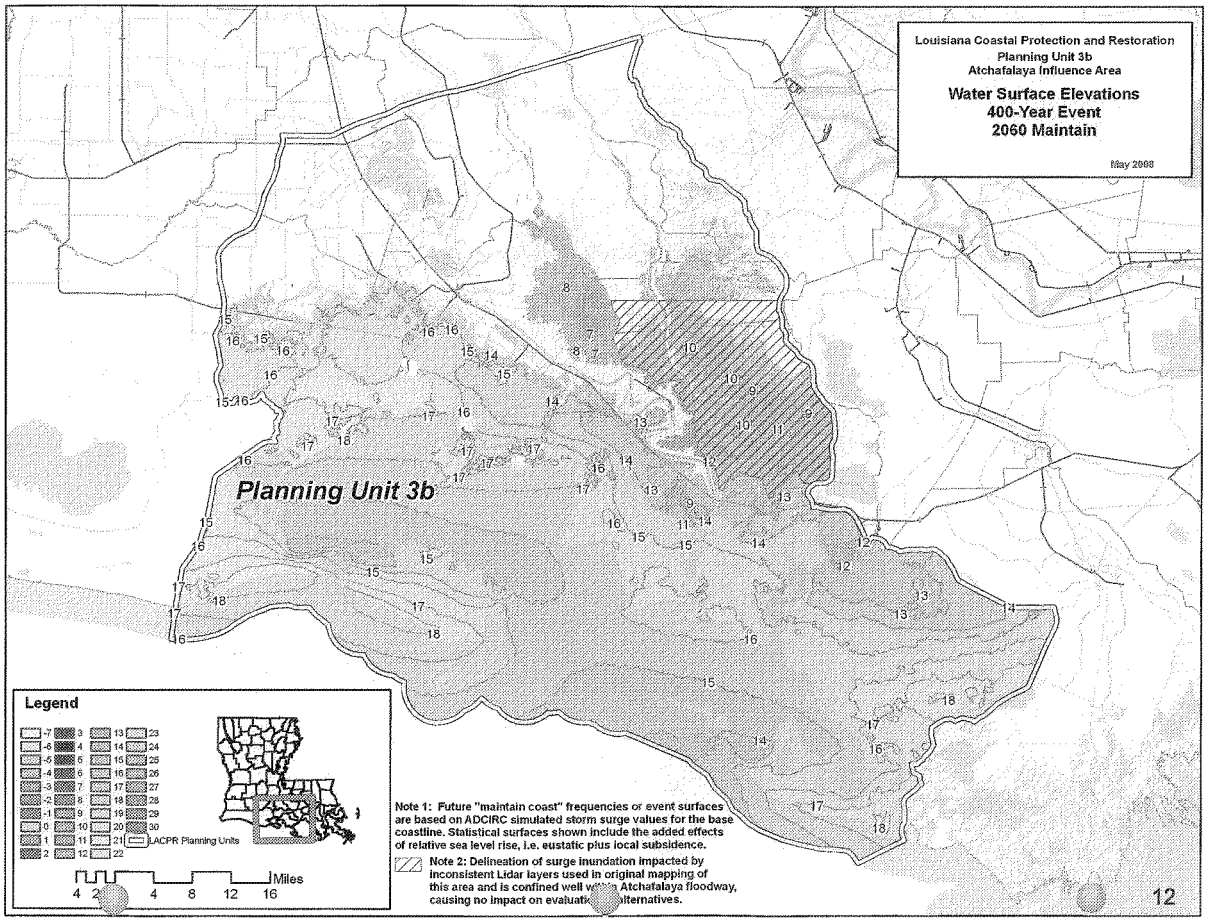
25
LACPR Planning Units
4 2 0 4 8 12 16
Miles
Note: Delineation of surge inundation impacted by inconsistent Lidar layers used in original mapping of this area and is confined well within Atchafalaya floodway, causing no impact on evaluation of alternatives.
7

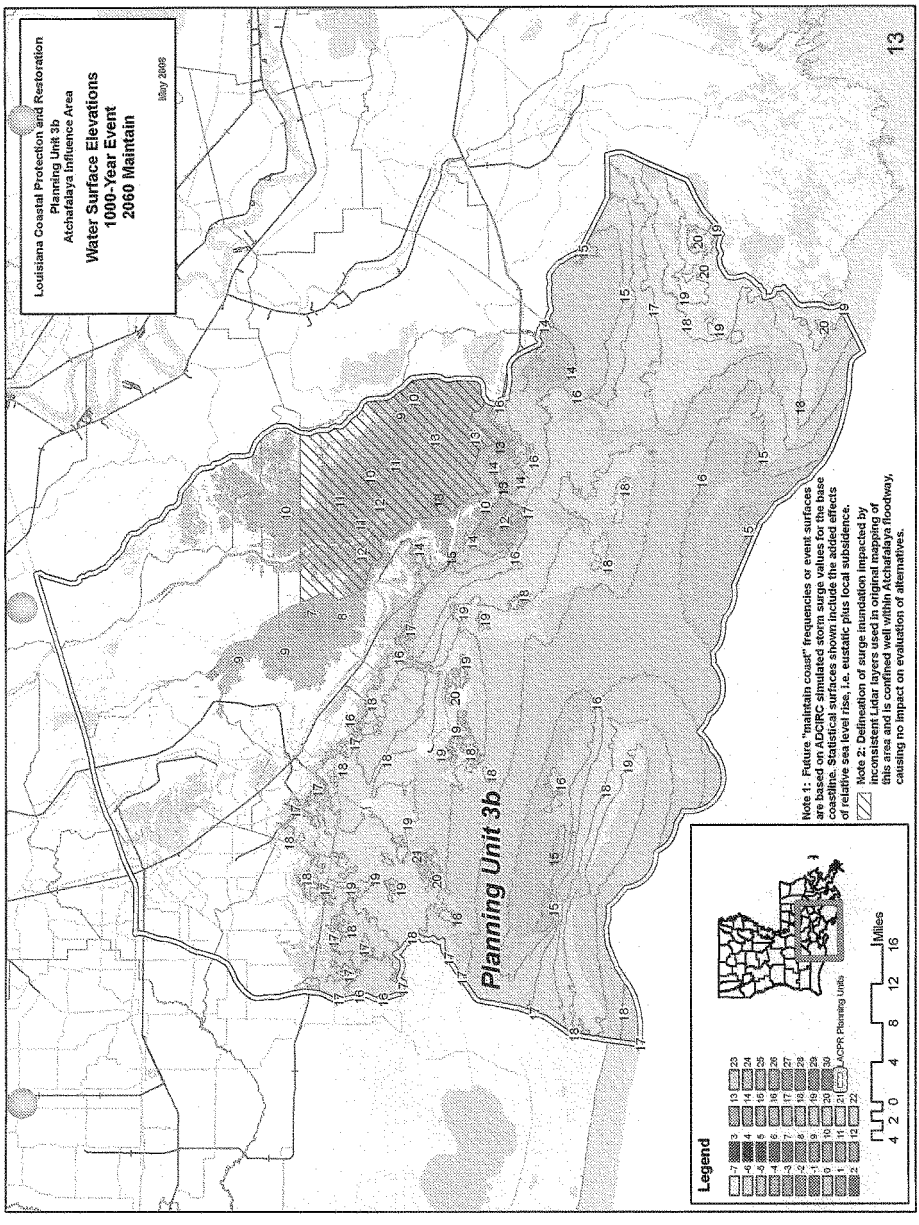

Louisiana Coastal Protection and Restoration
Planning Unit 3b
Atchafalaya Influence Area
Water Surface Elevations
100-Year Event
2060 No Action
May 2016
Planning Unit 3b
Legend
LACPR Planning Units
Miles
4 2 4 8 12 16
Note: Future "no-action" frequencies or event surfaces are based on ADCIRC simulated storm surge values for a projected "50-yr" future coast based on no additional coastal restoration. Statistical surfaces shown include the added effects of relative sea level rise, i.e. eustatic plus local subsidence.
8


Louisiana Coastal Protection and Restoration
Planning Unit 3b
Atchafalaya Influence Area
Water Surface Elevations
400-Year Event
2060 No Action
May 2008
Planning Unit 3b
Legend
-7 -6 -5 -4 -3 -2 -1 0 1 2
3 4 5 6 7 8 9 10 11 12
13 14 15 16 17 18 19 20 21 22
23 24 25 26 27 28 29 30
LACPR Planning Units
4 2 0 4 8 12 16
Miles
Note: Future "no-action" frequencies or event surfaces are based on ADCIRC simulated storm surge values for a projected "50-yr" future coast based on no additional coastal restoration. Statistical surfaces shown include the added effects of relative sea level rise, i.e. eustatic plus local subsidence.
9


Louisiana Coastal Protection and Restoration
Planning Unit 3b
Atchafalaya Influence Area
Water Surface Elevations
1000-Year Event
2060 No Action
May 2006
Planning Unit 3b
Legend
LACPR Planning Units
Miles
4 2 4 8 12 16
Note: Future "no-action" frequencies or event surfaces are based on ADCIRC simulated storm surge values for a projected "50-yr" future coast based on no additional coastal restoration. Statistical surfaces shown include the added effects of relative sea level rise, i.e. eustatic plus local subsidence.
10


Louisiana Coastal Protection and Restoration
Planning Unit 3b
Atchafalaya Influence Area
Water Surface Elevations
100-Year Event
2060 Maintain
May 2008
Planning Unit 3b
Legend
LACPR Planning Units
Miles
Note 1: Future "maintain coast" frequencies or event surfaces are based on ADCIRC simulated storm surge values for the base coastline. Statistical surfaces shown include the added effects of relative sea level rise, i.e. eustatic plus local subsidence.
Note 2: Delineation of surge inundation impacted by inconsistent Lidar layers used in original mapping of this area and is confined well within Atchafalaya floodway, causing no impact on evaluation of alternatives.
11


Louisiana Coastal Protection and Restoration
Planning Unit 3b
Atchafalaya Influence Area
Water Surface Elevations
400-Year Event
2060 Maintain
May 2008
Planning Unit 3b
Legend
LACPR Planning Units
Miles
4 2 4 8 12 16
Note 1: Future "maintain coast" frequencies or event surfaces are based on ADCIRC simulated storm surge values for the base coastline. Statistical surfaces shown include the added effects of relative sea level rise, i.e. eustatic plus local subsidence.
Note 2: Delineation of surge inundation impacted by inconsistent Lidar layers used in original mapping of this area and is confined well within Atchafalaya floodway, causing no impact on evaluation alternatives.
12


Louisiana Coastal Protection and Restoration
Planning Unit 3b
Atchafalaya Influence Area
Water Surface Elevations
1000-Year Event
2060 Maintain
May 2009
Planning Unit 3b
Legend
-7 -6 -5 -4 -3 -2 -1 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
CPRA Planning Units
Miles
4 2 0 4 8 12 16
Note 1: Future "maintain coast" frequencies or event surfaces are based on ADCIRC simulated storm surge values for the base coastline. Statistical surfaces shown include the added effects of relative sea level rise, i.e. eustatic plus local subsidence.
Note 2: Delineation of surge inundation impacted by inconsistent Lidar layers used in original mapping of this area and is confined well within Atchafalaya floodway, causing no impact on evaluation of alternatives.
13

Planning Unit:	3b	Alt. No.:	PU3b-0	Category:	No Action
Alternative Description:	No action (without project) alternative.				
Coastal Component:	Degraded coast--increasing risk.		Nonstructural Component:		None
Structural Component:	No new levees or increases in risk reduction level for existing levees.				

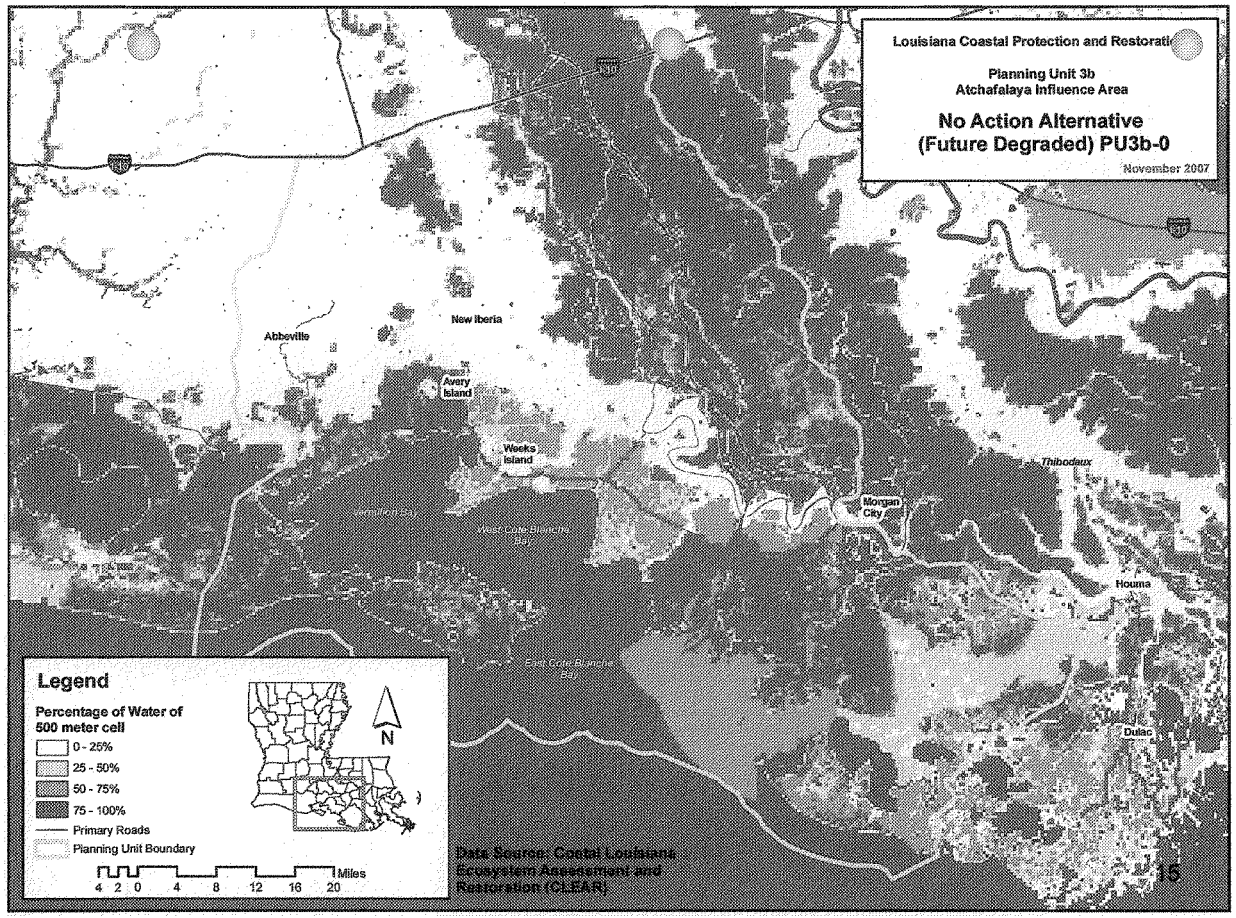
Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	0	4,331	203	343	1,176	78	19	13	1
		Mid		6,163	326	503	1,849	118	17	10	1
		Low		7,655	469	614	2,248	141	14	6	0
2	High RSLR High Employment Dispersed Population	High	0	4,852	242	272	1,347	94	19	11	1
		Mid		6,771	379	341	2,017	133	17	8	0
		Low		8,345	529	383	2,357	150	14	3	0
3	Low RSLR Business-as-Usual Compact Population	High	0	4,055	201	360	1,178	81	19	13	1
		Mid		5,863	323	525	1,826	119	17	10	1
		Low		7,317	460	645	2,207	142	14	6	0
4	High RSLR Business-as-Usual Compact Population	High	0	4,571	239	431	1,332	94	19	11	1
		Mid		6,445	373	605	1,997	135	17	8	0
		Low		8,000	516	706	2,338	153	14	3	0

Other Results		Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Construction Time (years)	0	After 50 yrs (% of baseline)	97	95	97	95
Direct Wetland Impacts (acres)	0	After 100 yrs (% of baseline)	94	89	94	89
Indirect Impacts (unitless)	0	Present Value of Life Cycle Costs ($ Millions)				
Spatial Integrity (unitless)	0.31	Coastal Component	0	0	0	0
Non-Federal Share of Present Value of Life Cycle Costs	Scenario / ($ Millions)	Nonstructural Component	0	0	0	0
	1 / 2: 0 / 0	Structural Component	0	0	0	0
	3 / 4: 0 / 0	Total Project	0	0	0	0

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 3b
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	
10-year	1,024	N/A	1,523	N/A	1,013	N/A	1,543	N/A	No Action Plan
100-year	4,254	N/A	5,717	N/A	4,148	N/A	5,447	N/A	
400-year	8,571	N/A	9,628	N/A	7,772	N/A	8,782	N/A	
1,000-year	11,203	N/A	11,827	N/A	10,886	N/A	11,680	N/A	
2,000-year	12,281	N/A	12,591	N/A	12,370	N/A	12,769	N/A	

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels

1939


Louisiana Coastal Protection and Restorati
Planning Unit 3b
Atchafalaya Influence Area
No Action Alternative
(Future Degraded) PU3b-0
November 2007
New Iberia
Abbeville
Avery Island
Weeks Island
Thibodaux
Morgan City
Houma
Dulac
Legend
Percentage of Water of 500 meter cell
0 - 25%
25 - 50%
50 - 75%
75 - 100%
Primary Roads
Planning Unit Boundary
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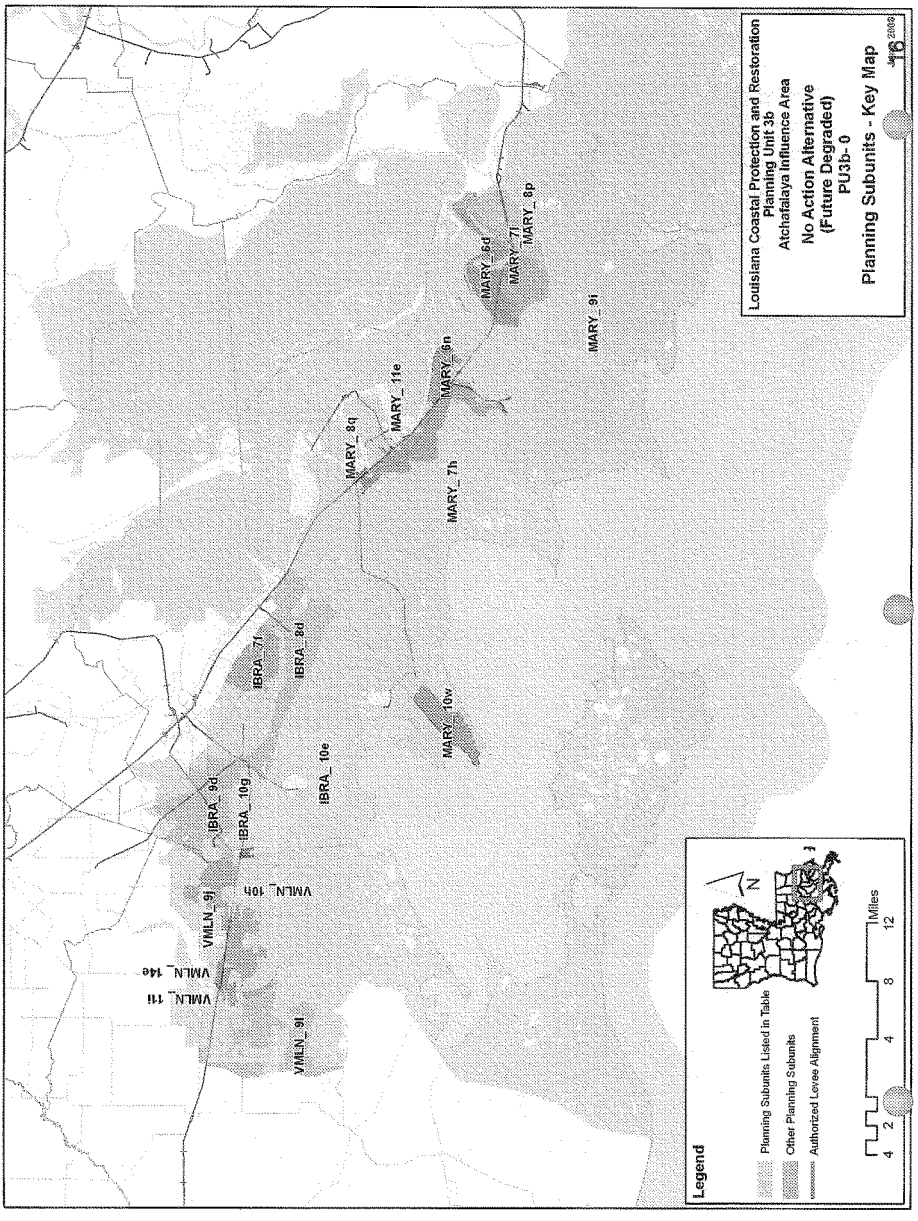
Miles
4 2 0 4 8 12 16 20
Data Source: Coastal Louisiana Ecosystem Assessment and Restoration (CLEAR)
15

1940


Louisiana Coastal Protection and Restoration
Planning Unit 3b
Atchafalaya Influence Area
No Action Alternative
(Future Degraded)
PU3b- 0
Planning Subunits - Key Map
Legend
Planning Subunits Listed in Table
Other Planning Subunits
Authorized Levee Alignment
Miles
4 2 0 4 8 12
N
VMLN_11i
VMLN_14e
VMLN_9i
VMLN_9j
VMLN_10h
IBRA_9d
IBRA_10g
IBRA_10e
IBRA_7l
IBRA_8d
MARY_10w
MARY_7b
MARY_8q
MARY_11e
MARY_8n
MARY_8d
MARY_7l
MARY_8p
MARY_9i

Alternative: PU3b-0

Water Surface Elevations (feet - NAVD88 2004.65)

Planning Sub Unit	2010 (Base) Conditions						2060 (Future) Conditions					
	100-yr Event		400-year Event		1,000-yr Event		100-yr Event		400-year Event		1,000-yr Event	
	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project
IBRA_10e	11.7		15.2		17.0		14.9		18.4		20.2	
IBRA_10g	11.5		15.4		17.8		14.7		18.6		21.0	
IBRA_7f	8.1		11.3		14.5		11.3		14.5		17.7	
IBRA_8d	10.1		15.2		19.1		13.3		18.4		22.3	
IBRA_9d	9.0		13.8		17.1		12.2		17.0		20.3	
MARY_10w	11.7		16.0		17.9		13.9		17.6		20.0	
MARY_11e	7.8		11.3		14.1		11.0		14.5		17.3	
MARY_6d	7.8		9.6		12.0		11.0		12.8		15.2	
MARY_6n	7.9		13.9		14.8		11.1		17.1		18.0	
MARY_7h	7.8		10.9		13.2		11.0		14.1		16.4	
MARY_7l	7.8		10.6		13.1		11.0		13.8		16.3	
MARY_8p	8.6		12.4		14.8		11.8		15.6		18.0	
MARY_8q	8.2		13.5		17.2		11.4		16.7		20.4	
MARY_9i	9.9		13.4		15.4		13.1		16.6		18.6	
VMLN_10h	11.4		15.6		18.3		14.6		18.8		21.5	
VMLN_11i	7.8		11.3		14.8		11.0		14.5		18.0	
VMLN_14e	7.8		9.4		14.3		11.0		12.6		17.5	
VMLN_9j	7.8		13.1		16.3		11.0		16.3		19.5	
VMLN_9l	10.6		13.7		15.5		13.8		16.9		18.7	

Evaluation Parameters				
	Confidence Level:	90%	Levee Design:	No Friction Waves
	Future Relative Sea Level Rise:	3.2 feet	Levee Overtopping:	No Friction Waves

1942

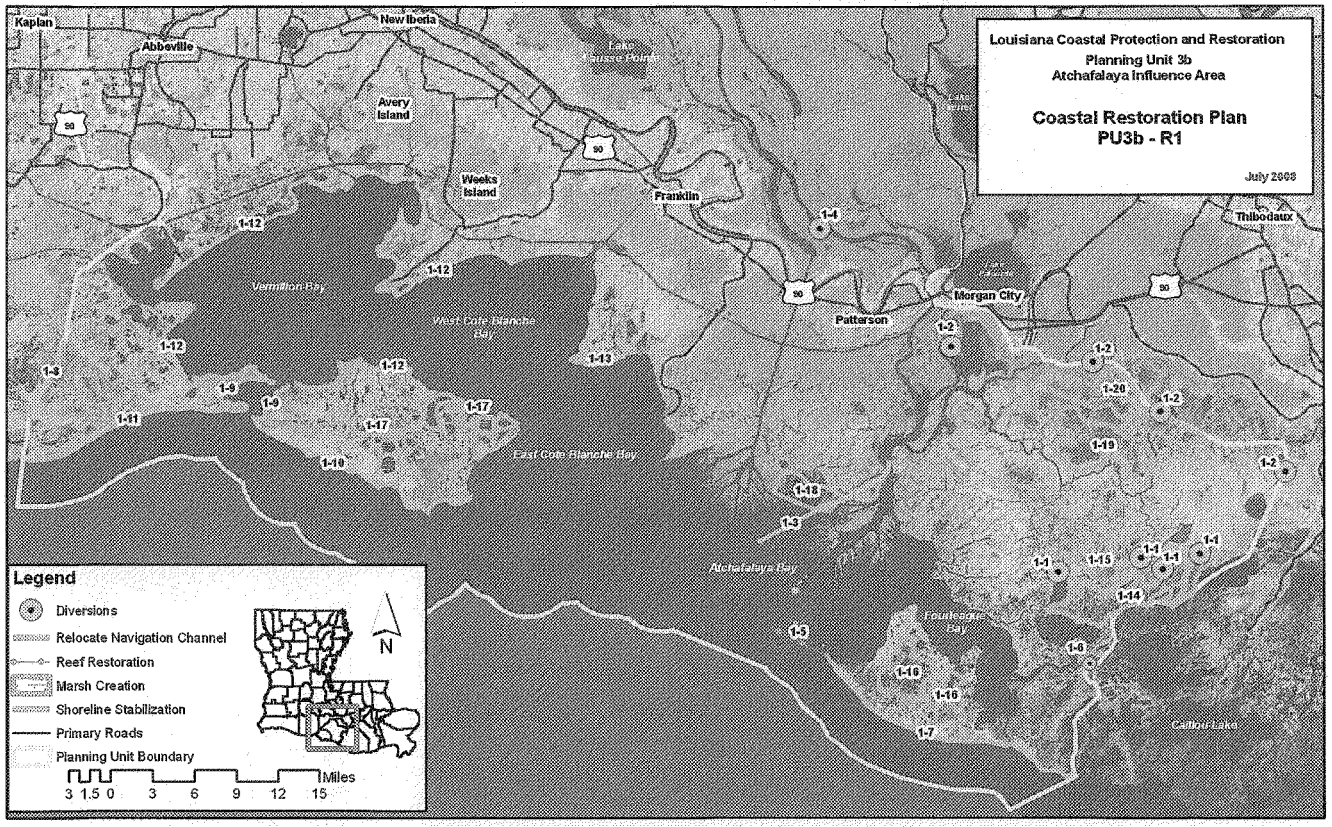
Planning Unit:	3b	Alt. No.:	PU3b-R1	Category:	Coastal Restoration Only
Alternative Description:	Sustain coastal landscape through restoration including shoreline protection, marsh creation, etc.				
Coastal Component:	R1		Nonstructural Component:		None
Structural Component:	No new levees or increases in risk reduction level for existing levees.				

Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	243	4,326	203	343	1,177	78	154	2	2
		Mid		6,162	327	502	1,847	118	130	2	2
		Low		7,655	469	613	2,247	141	106	2	0
2	High RSLR High Employment Dispersed Population	High	245	4,854	242	413	1,347	94	154	4	2
		Mid		6,761	379	571	2,017	133	130	2	1
		Low		8,344	529	665	2,358	150	106	2	0
3	Low RSLR Business-as-Usual Compact Population	High	243	4,051	201	361	1,179	81	154	2	2
		Mid		5,862	323	524	1,823	119	130	2	2
		Low		7,316	460	645	2,207	142	106	2	0
4	High RSLR Business-as-Usual Compact Population	High	245	4,574	239	431	1,332	94	154	4	2
		Mid		6,440	373	605	1,997	135	130	2	1
		Low		7,998	516	706	2,339	153	106	2	0

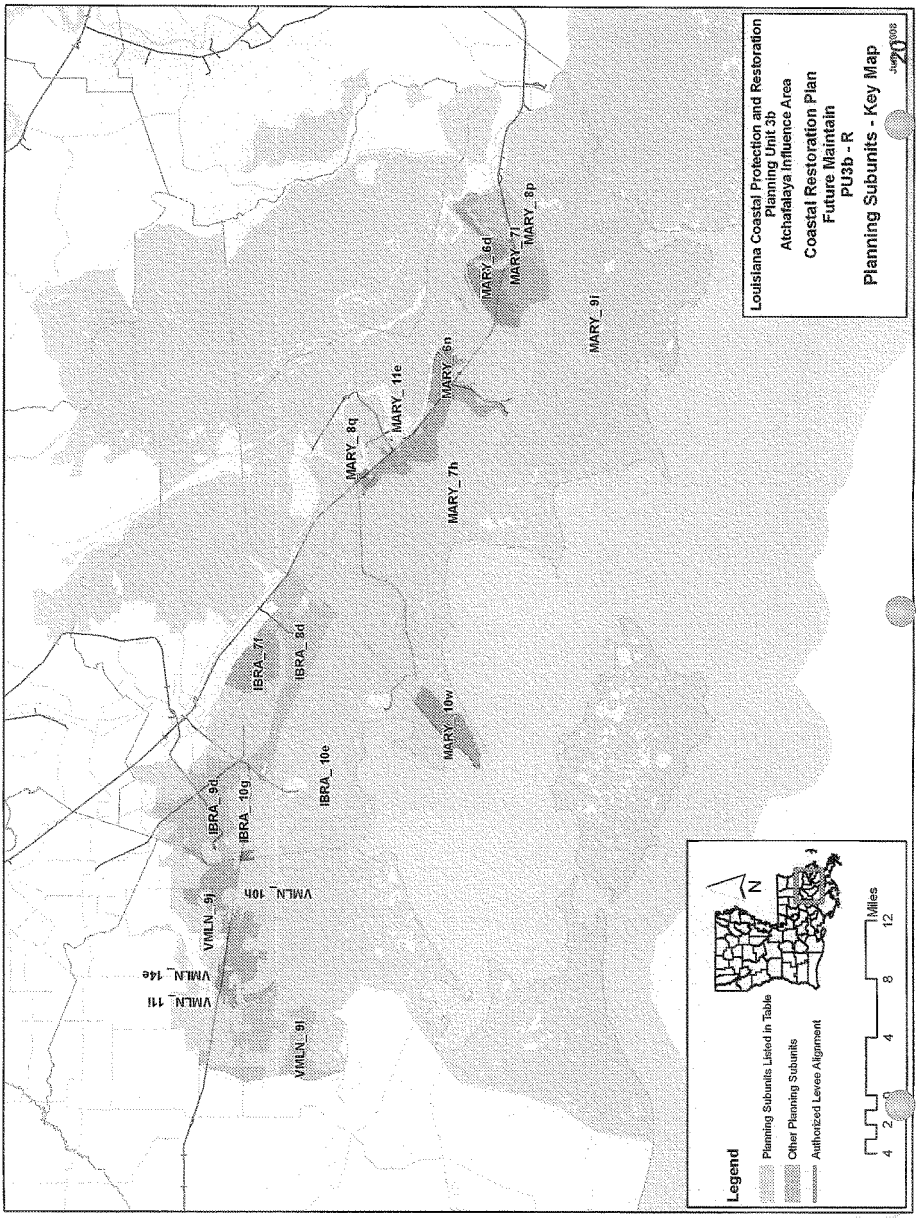
Other Results		Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Construction Time (years)	15	After 50 yrs (% of baseline)	105	104	105	104
Direct Wetland Impacts (acres)	0	After 100 yrs (% of baseline)	105	100	105	100
Indirect Impacts (unitless)	0	Present Value of Life Cycle Costs ($ Millions)				
Spatial Integrity (unitless)	0.44	Coastal Component	4,756	4,796	4,756	4,796
Non-Federal Share of Present Value of Life Cycle Costs	Scenario ($ Millions)	Nonstructural Component	0	0	0	0
	1 / 2 1,664 1,679	Structural Component	0	0	0	0
	3 / 4 1,664 1,679	Total Project	4,756	4,796	4,756	4,796

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 3b Coastal Plan Coastal Restoration Alt
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	
10-year	1,024	1,022	1,523	1,522	1,013	1,012	1,543	1,545	
100-year	4,254	4,253	5,717	5,721	4,148	4,147	5,447	5,452	
400-year	8,571	8,576	9,628	9,629	7,772	7,771	8,782	8,779	
1,000-year	11,203	11,197	11,827	11,823	10,886	10,877	11,680	11,673	
2,000-year	12,281	12,280	12,591	12,590	12,370	12,369	12,769	12,766	

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels.


Louisiana Coastal Protection and Restoration
Planning Unit 3b
Atchafalaya Influence Area
Coastal Restoration Plan
PU3b - R1
July 2008
Kaplan
Abbeville
New Iberia
Avery Island
Weeks Island
Franklin
Morgan City
Patterson
Thibodaux
Vermilion Bay
West Cote Blanche Bay
East Cote Blanche Bay
Atchafalaya Bay
Four League Bay
Calcasieu Lake
Legend
Diversions
Relocate Navigation Channel
Reef Restoration
Marsh Creation
Shoreline Stabilization
Primary Roads
Planning Unit Boundary
N
Miles
3 1.5 0 3 6 9 12 15

1944


Louisiana Coastal Protection and Restoration
Planning Unit 3b
Atchafalaya Influence Area
Coastal Restoration Plan
Future Maintain
PU3b - R
Planning Subunits - Key Map
Legend
Planning Subunits Listed in Table
Other Planning Subunits
Authorized Levee Alignment
Miles
IBRA_9d
IBRA_10g
IBRA_7l
IBRA_8d
IBRA_10e
VMLN_9j
VMLN_10h
VMLN_14e
VMLN_11l
VMLN_9l
MARY_10v
MARY_7h
MARY_8q
MARY_11e
MARY_6n
MARY_6d
MARY_7l
MARY_8p
MARY_9i

Alternative: PU3b-R1

Water Surface Elevations (feet - NAVD88 2004.65)

Planning Sub Unit	2010 (Base) Conditions*						2060 (Future) Conditions					
	100-yr Event		400-year Event		1,000-yr Event		100-yr Event		400-year Event		1,000-yr Event	
	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project
IBRA_10e	11.7	11.7	15.2	15.2	17.0	17.0	14.9	14.9	18.4	18.4	20.2	20.2
IBRA_10g	11.5	11.5	15.4	15.4	17.8	17.8	14.7	14.7	18.6	18.6	21.0	21.0
IBRA_7f	8.1	8.1	11.3	11.3	14.5	14.5	11.3	11.3	14.5	14.5	17.7	17.7
IBRA_8d	10.1	10.1	15.2	15.2	19.1	19.1	13.3	13.3	18.4	18.4	22.3	22.3
IBRA_9d	9.0	9.0	13.8	13.8	17.1	17.1	12.2	12.2	17.0	17.0	20.3	20.3
MARY_10w	11.7	11.7	16.0	16.0	17.9	17.9	13.9	14.9	17.6	19.2	20.0	21.1
MARY_11e	7.8	7.8	11.3	11.3	14.1	14.1	11.0	11.0	14.5	14.5	17.3	17.3
MARY_6d	7.8	7.8	9.6	9.6	12.0	12.0	11.0	11.0	12.8	12.8	15.2	15.2
MARY_6n	7.9	7.9	13.9	13.9	14.8	14.8	11.1	11.1	17.1	17.1	18.0	18.0
MARY_7h	7.8	7.8	10.9	10.9	13.2	13.2	11.0	11.0	14.1	14.1	16.4	16.4
MARY_7l	7.8	7.8	10.6	10.6	13.1	13.1	11.0	11.0	13.8	13.8	16.3	16.3
MARY_8p	8.6	8.6	12.4	12.4	14.8	14.8	11.8	11.8	15.6	15.6	18.0	18.0
MARY_8q	8.2	8.2	13.5	13.5	17.2	17.2	11.4	11.4	16.7	16.7	20.4	20.4
MARY_9i	9.9	9.9	13.4	13.4	15.4	15.4	13.1	13.1	16.6	16.6	18.6	18.6
VMLN_10h	11.4	11.4	15.6	15.6	18.3	18.3	14.6	14.6	18.8	18.8	21.5	21.5
VMLN_11i	7.8	7.8	11.3	11.3	14.8	14.8	11.0	11.0	14.5	14.5	18.0	18.0
VMLN_14e	7.8	7.8	9.4	9.4	14.3	14.3	11.0	11.0	12.6	12.6	17.5	17.5
VMLN_9j	7.8	7.8	13.1	13.1	16.3	16.3	11.0	11.0	16.3	16.3	19.5	19.5
VMLN_9l	10.6	10.6	13.7	13.7	15.5	15.5	13.8	13.8	16.9	16.9	18.7	18.7

Evaluation Parameters				
	Confidence Level:	90%	Levee Design:	No Friction Waves
	Future Relative Sea Level Rise:	3.2 feet	Levee Overtopping:	No Friction Waves

* With and without project base conditions (2010) are the same for coastal restoration only plans.

Planning Unit:	3b	Alt. No.:	PU3b-NS-100	Category:	Coastal Restoration + Nonstructural Measures
Alternative Description:	Sustain coastal landscape through restoration. Implement comprehensive 100-year nonstructural measures.				
Coastal Component:	R1		Nonstructural Component:		100-yr stand alone measures
Structural Component:	No new levees or increases in risk reduction level for existing levees.				

Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	377	3,848	81	82	383	19	154	2	2
		Mid		5,662	146	205	855	48	130	2	2
		Low		7,118	245	288	1,142	65	106	2	0
2	High RSLR High Employment Dispersed Population	High	379	4,117	90	72	509	31	154	4	2
		Mid		5,970	173	147	971	60	130	2	1
		Low		7,473	283	195	1,230	74	106	2	0
3	Low RSLR Business-as-Usual Compact Population	High	380	3,603	80	80	358	17	154	2	2
		Mid		5,396	143	208	812	47	130	2	2
		Low		6,818	237	296	1,082	63	106	2	0
4	High RSLR Business-as-Usual Compact Population	High	382	3,870	89	137	478	29	154	4	2
		Mid		5,693	169	263	933	59	130	2	1
		Low		7,169	272	339	1,188	73	106	2	0

Other Results			Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Construction Time (years)		15	After 50 yrs (% of baseline)	105	104	105	104
Direct Wetland Impacts (acres)		0	After 100 yrs (% of baseline)	105	100	105	100
Indirect Impacts (unitless)		0	Present Value of Life Cycle Costs ($ Millions)				
Spatial Integrity (unitless)		0.44	Coastal Component	4,756	4,796	4,756	4,796
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)	Nonstructural Component	2,628	2,628	2,698	2,698
	1 / 2	2,584	Structural Component	0	0	0	0
	3 / 4	2,609	Total Project	7,383	7,424	7,454	7,494
		2,623					

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)								
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4	
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj
10-year	1,024	141	1,523	331	1,013	137	1,543	347
100-year	4,254	2,344	5,717	4,542	4,148	2,237	5,447	4,259
400-year	8,571	7,954	9,628	9,163	7,772	7,133	8,782	8,294
1,000-year	11,203	10,805	11,827	11,505	10,886	10,465	11,680	11,338
2,000-year	12,281	11,993	12,591	12,328	12,370	12,068	12,769	12,492

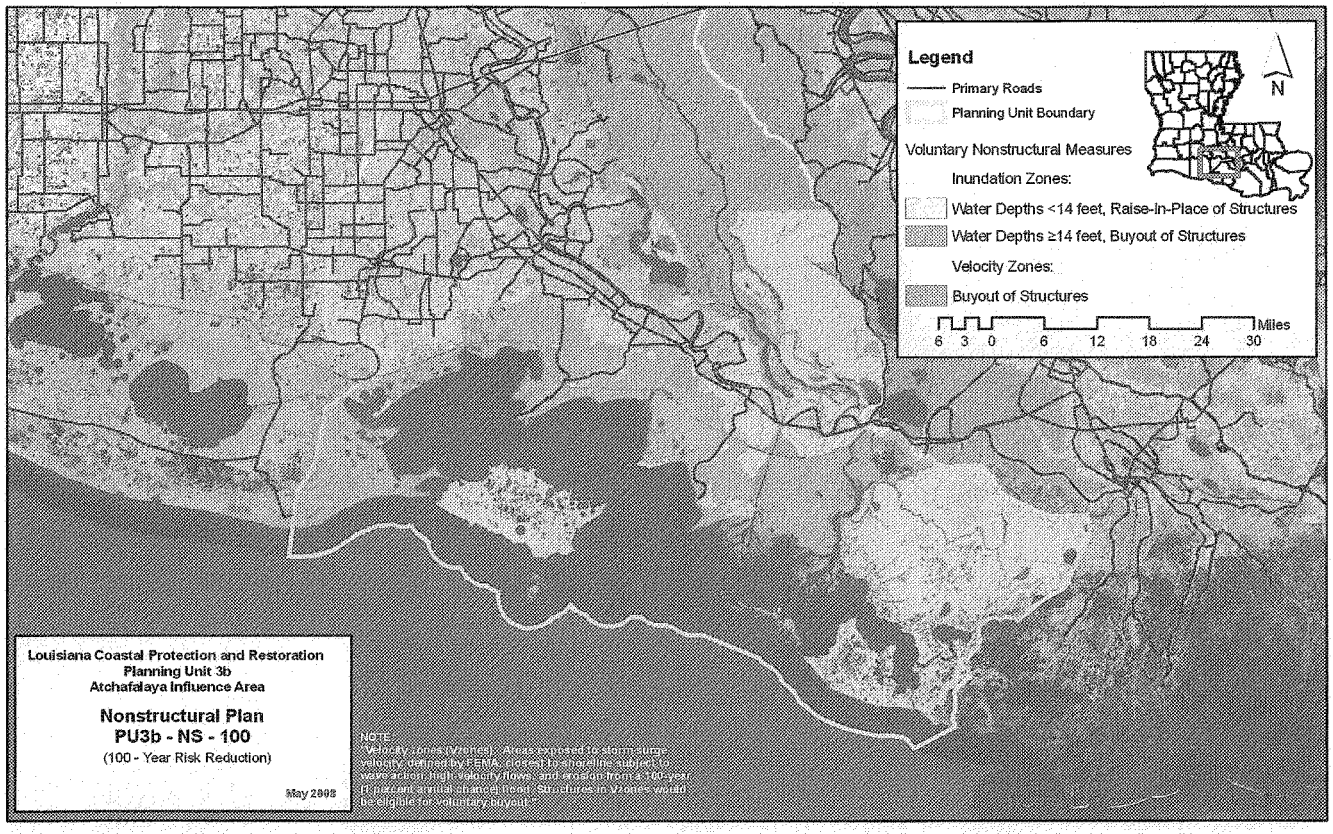
Planning Unit 3b

Nonstructural Plan

100-year Design

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels.

1947


Legend
Primary Roads
Planning Unit Boundary
Voluntary Nonstructural Measures
Inundation Zones:
Water Depths <14 feet, Raise-in-Place of Structures
Water Depths ≥14 feet, Buyout of Structures
Velocity Zones:
Buyout of Structures
6 3 0 6 12 18 24 30 Miles
N
Louisiana Coastal Protection and Restoration
Planning Unit 3b
Atchafalaya Influence Area
Nonstructural Plan
PU3b - NS - 100
(100 - Year Risk Reduction)
May 2008
NOTE:
"Velocity zones (V zones): Areas exposed to storm surge velocity, defined by FEMA, closest to shoreline subject to wave action, high velocity flows, and erosion from a 100-year (1 percent annual chance) flood. Structures in V zones would be eligible for voluntary buyout."

1948

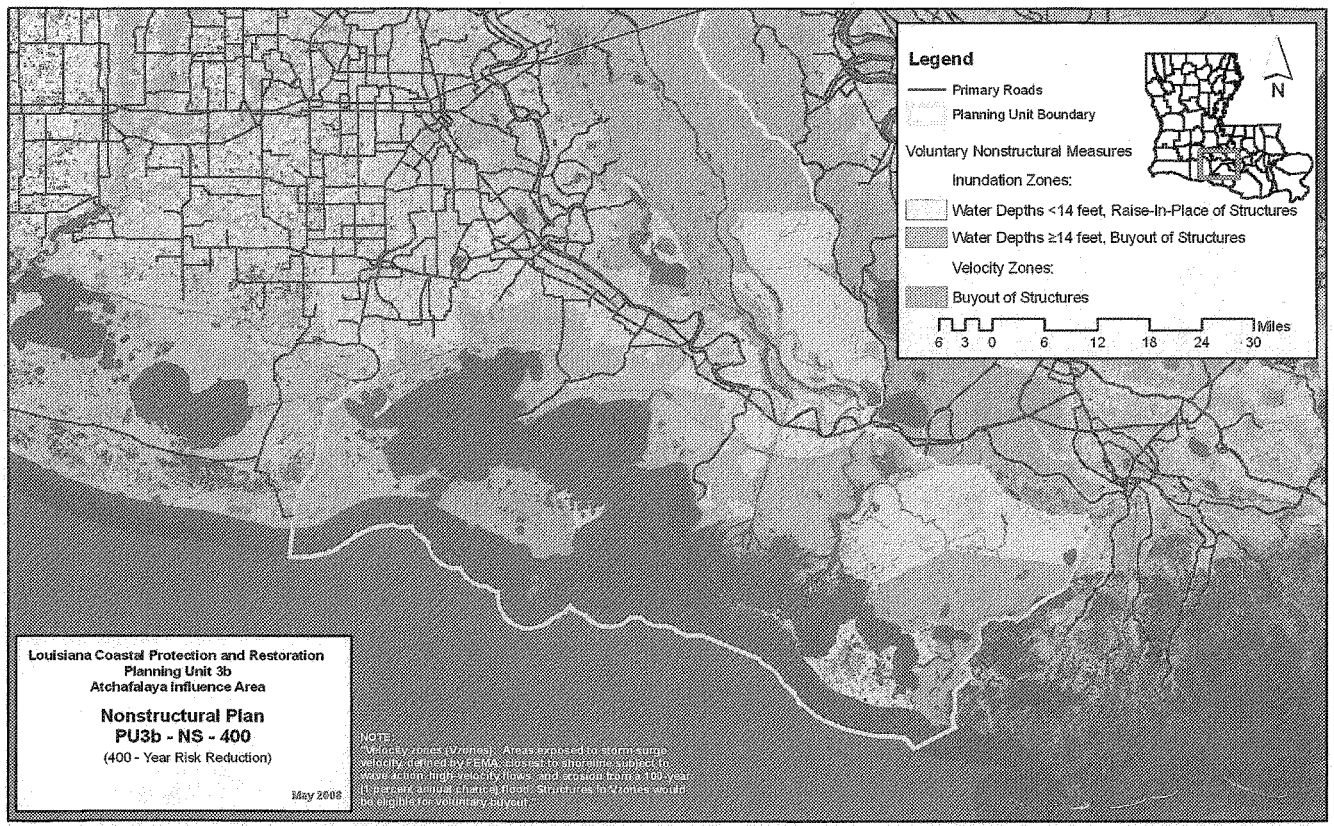
Planning Unit:	3b	Alt. No.:	PU3b-NS-400	Category:	Coastal Restoration + Nonstructural Measures
Alternative Description:	Sustain coastal landscape through restoration. Implement comprehensive 400-year nonstructural measures.				
Coastal Component:	R1		Nonstructural Component:		400-yr stand alone measures
Structural Component:	No new levees or increases in risk reduction level for existing levees.				

Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	475	3,848	72	66	333	15	154	2	2
		Mid		5,661	119	119	598	29	130	2	2
		Low		7,117	183	162	781	37	106	2	0
2	High RSLR High Employment Dispersed Population	High	477	4,116	75	4	338	15	154	4	2
		Mid		5,969	125	20	615	30	130	2	1
		Low		7,472	193	66	845	44	106	2	0
3	Low RSLR Business-as-Usual Compact Population	High	481	3,602	72	63	311	14	154	2	2
		Mid		5,395	118	114	560	27	130	2	2
		Low		6,818	179	158	727	35	106	2	0
4	High RSLR Business-as-Usual Compact Population	High	484	3,869	74	65	316	14	154	4	2
		Mid		5,692	123	122	577	29	130	2	1
		Low		7,169	189	194	788	41	106	2	0

Other Results			Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Construction Time (years)		15	After 50 yrs (% of baseline)	105	104	105	104
Direct Wetland Impacts (acres)		0	After 100 yrs (% of baseline)	105	100	105	100
Indirect Impacts (unitless)		0	Present Value of Life Cycle Costs ($ Millions)				
Spatial Integrity (unitless)		0.44	Coastal Component	4,756	4,796	4,756	4,796
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)	Nonstructural Component	4,557	4,557	4,683	4,683
	1 / 2	3,259	Structural Component	0	0	0	0
	3 / 4	3,303	Total Project	9,313	9,353	9,438	9,479

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 3b
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	
10-year	1,024	116	1,523	167	1,013	112	1,543	162	Nonstructural Plan
100-year	4,254	537	5,717	853	4,148	524	5,447	825	
400-year	8,571	3,643	9,628	6,793	7,772	3,185	8,782	6,048	
1,000-year	11,203	9,691	11,827	10,927	10,886	9,314	11,680	10,695	400-year Design
2,000-year	12,281	11,524	12,591	12,009	12,370	11,536	12,769	12,144	

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels.


Legend
Primary Roads
Planning Unit Boundary
Voluntary Nonstructural Measures
Inundation Zones:
Water Depths <14 feet, Raise-In-Place of Structures
Water Depths ≥14 feet, Buyout of Structures
Velocity Zones:
Buyout of Structures
N
Miles
6 3 0 6 12 18 24 30
Louisiana Coastal Protection and Restoration
Planning Unit 3b
Atchafalaya Influence Area
Nonstructural Plan
PU3b - NS - 400
(400 - Year Risk Reduction)
May 2008
NOTE:
Velocity zones (Vzones): Areas exposed to storm surge velocity defined by FEMA. Located in shoreline subject to severe storm, high velocity flows, and erosion from a 100-year (1 percent annual chance) flood. Structures in Vzones would be eligible for voluntary buyout.

1950

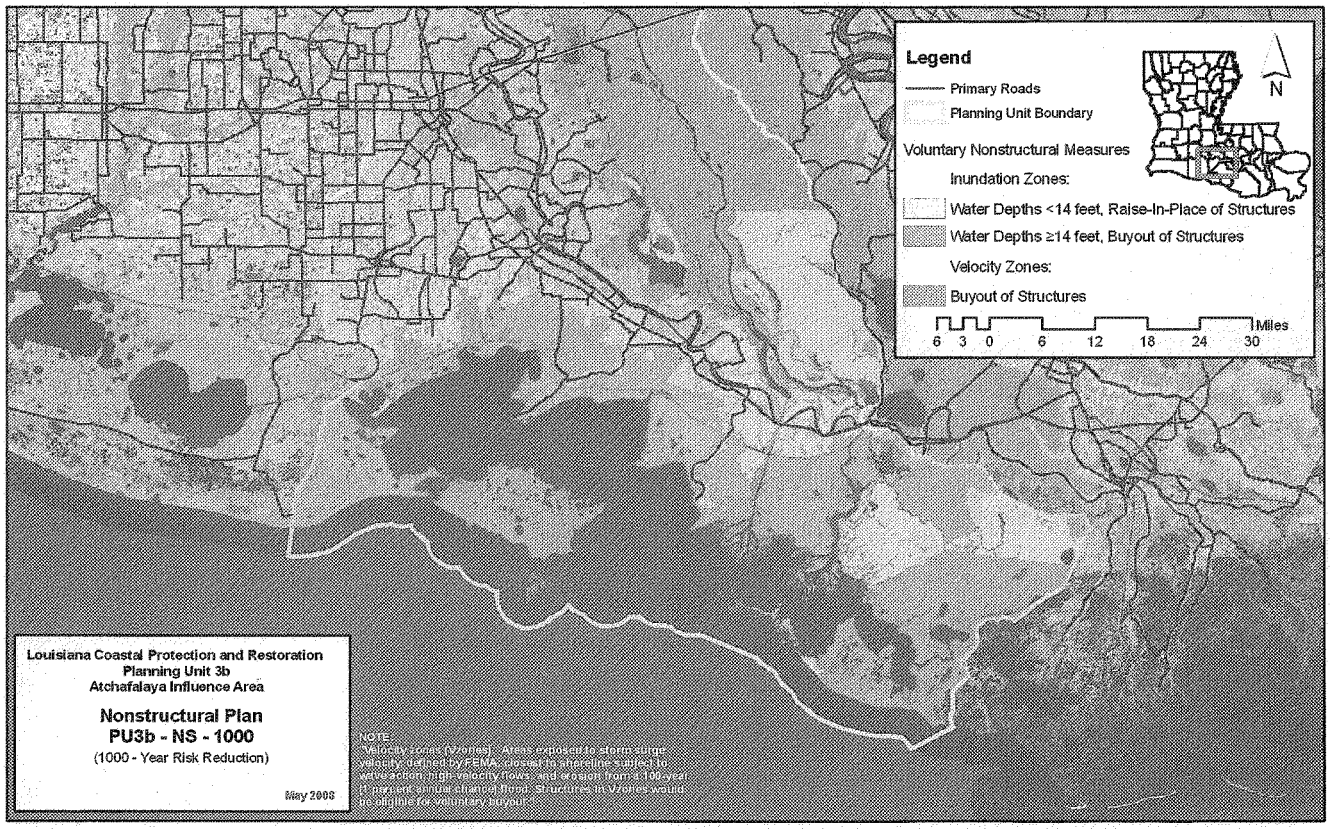
Planning Unit:	3b	Alt. No.:	PU3b-NS-1000	Category:	Coastal Restoration + Nonstructural Measures
Alternative Description:	Sustain coastal landscape through restoration. Implement comprehensive 1000-year nonstructural measures.				
Coastal Component:	R1		Nonstructural Component:		1000-yr stand alone measures
Structural Component:	No new levees or increases in risk reduction level for existing levees.				

Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands							
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	533	3,755	70	65	329	15	154	2	2
		Mid		5,562	114	107	568	27	130	2	2
		Low		7,016	166	138	705	32	106	2	0
2	High RSLR High Employment Dispersed Population	High	535	4,024	72	0	330	15	154	4	2
		Mid		5,870	117	4	575	27	130	2	1
		Low		7,370	171	15	723	34	106	2	0
3	Low RSLR Business-as-Usual Compact Population	High	567	3,519	70	62	308	14	154	2	2
		Mid		5,311	113	102	534	25	130	2	2
		Low		6,732	164	133	662	30	106	2	0
4	High RSLR Business-as-Usual Compact Population	High	569	3,786	71	62	309	14	154	4	2
		Mid		5,609	116	105	540	26	130	2	1
		Low		7,083	168	141	680	32	106	2	0

Other Results				Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Construction Time (years)			15	After 50 yrs (% of baseline)	105	104	105	104
Direct Wetland Impacts (acres)			0	After 100 yrs (% of baseline)	105	100	105	100
Indirect Impacts (unitless)			0	Present Value of Life Cycle Costs ($ Millions)				
Spatial Integrity (unitless)			0.44	Coastal Component	4,756	4,796	4,756	4,796
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)		Nonstructural Component	5,701	5,701	6,353	6,353
	1 / 2	3,660	3,674	Structural Component	0	0	0	0
	3 / 4	3,888	3,902	Total Project	10,457	10,497	11,108	11,149

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 3b
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	
10-year	1,024	103	1,523	139	1,013	100	1,543	135	Nonstructural Plan
100-year	4,254	433	5,717	565	4,148	424	5,447	555	
400-year	8,571	817	9,628	1,370	7,772	801	8,782	1,309	
1,000-year	11,203	3,928	11,827	7,609	10,886	3,963	11,680	7,536	1000-year Design
2,000-year	12,281	9,274	12,591	10,830	12,370	9,374	12,769	10,929	

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels.


Legend
Primary Roads
Planning Unit Boundary
Voluntary Nonstructural Measures
Inundation Zones:
Water Depths <14 feet, Raise-In-Place of Structures
Water Depths ≥14 feet, Buyout of Structures
Velocity Zones:
Buyout of Structures
N
6 3 0 6 12 18 24 30 Miles
Louisiana Coastal Protection and Restoration
Planning Unit 3b
Atchafalaya Influence Area
Nonstructural Plan
PU3b - NS - 1000
(1000 - Year Risk Reduction)
May 2008
NOTE:
"Velocity zones (V zones): Areas exposed to storm surge velocity, defined by FEMA, closest to shoreline subject to wave action, high velocity flows, and erosion from a 100-year (1 percent annual chance) flood. Structures in V zones would be eligible for voluntary buyout."

1952

Planning Unit:	3b	Alt. No.:	PU3b-G-100-1	Category:	Coastal Restoration + Structural Measures
Alternative Description:	Sustain coastal landscape through restoration. Raise ring levee around Patterson/Berwick to 100-year design level and construct levee along the GIWW west to the boundary of Planning Unit 4 at the 100-year design level.				
Coastal Component:	R1		Nonstructural Component:		None
Structural Component:	See alternative description above.				

Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands							
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	1,020	1,660	94	121	514	27	312	20	5
		Mid		2,465	146	180	816	43	288	19	5
		Low		3,227	210	225	1,000	52	264	18	5
2	High RSLR High Employment Dispersed Population	High	1,023	1,733	100	54	536	29	312	20	5
		Mid		2,551	154	65	838	45	288	18	5
		Low		3,324	219	78	1,014	53	264	18	4
3	Low RSLR Business-as-Usual Compact Population	High	1,020	1,562	94	121	496	27	312	20	5
		Mid		2,357	145	179	782	42	288	19	5
		Low		3,101	208	226	957	50	264	18	5
4	High RSLR Business-as-Usual Compact Population	High	1,023	1,633	100	131	516	29	312	20	5
		Mid		2,439	153	191	806	44	288	18	5
		Low		3,198	216	233	973	52	264	18	4

Other Results	
Construction Time (years)	10
Direct Wetland Impacts (acres)	2,300
Indirect Impacts (unitless)	-8
Spatial Integrity (unitless)	0.44

Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)	
	1 / 2	7,047	7,070
	3 / 4	7,047	7,070

Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
After 50 yrs (% of baseline)	105	104	105	104
After 100 yrs (% of baseline)	105	100	105	100
Present Value of Life Cycle Costs ($ Millions)				
Coastal Component	4,756	4,796	4,756	4,796
Nonstructural Component	0	0	0	0
Structural Component	15,214	15,238	15,214	15,238
Total Project	19,970	20,035	19,970	20,035

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)								
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4	
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj
10-year	1,024	158	1,523	194	1,013	159	1,543	196
100-year	4,254	318	5,717	359	4,148	318	5,447	357
400-year	8,571	567	9,628	614	7,772	579	8,782	633
1,000-year	11,203	2,867	11,827	2,883	10,886	2,950	11,680	2,969
2,000-year	12,281	6,368	12,591	6,412	12,370	6,321	12,769	6,338

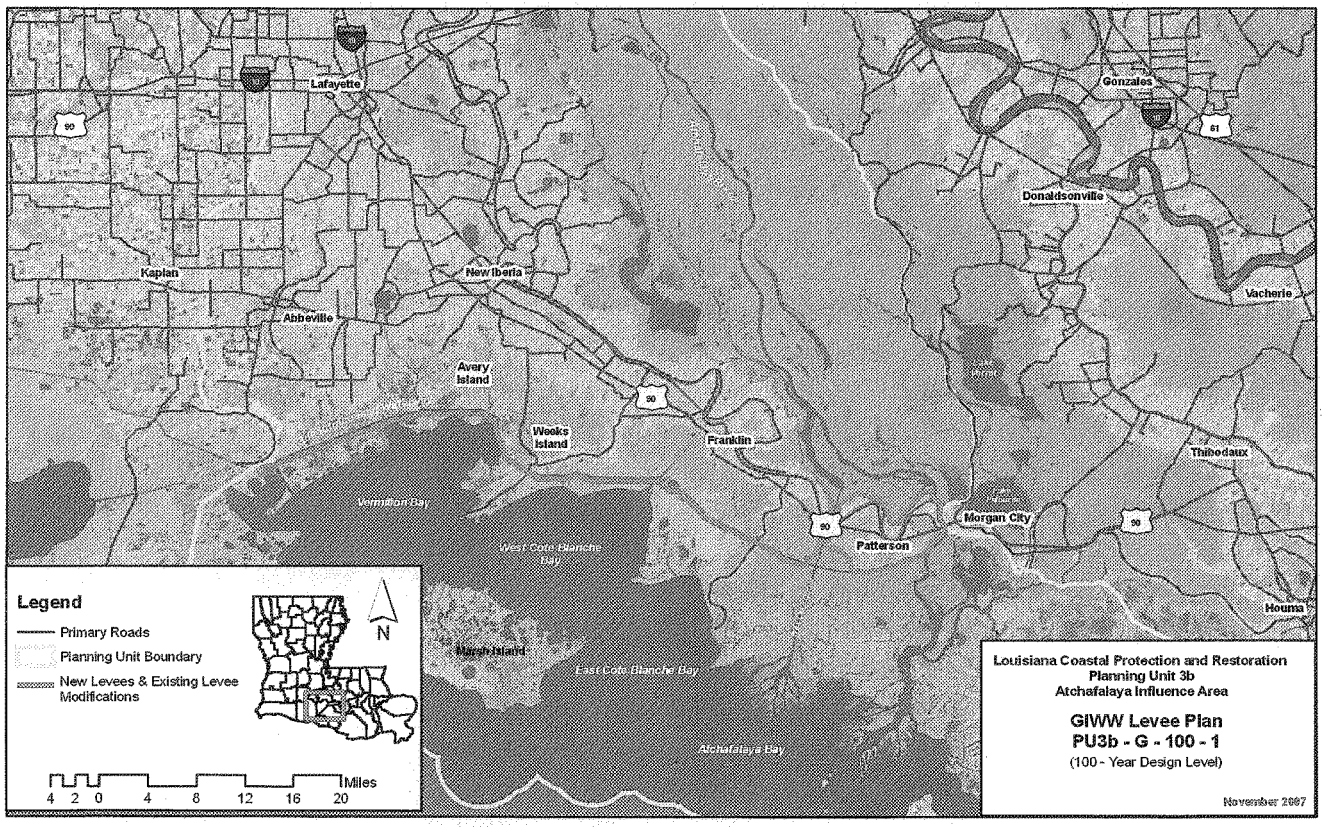
Planning Unit 3b

Structural Plan

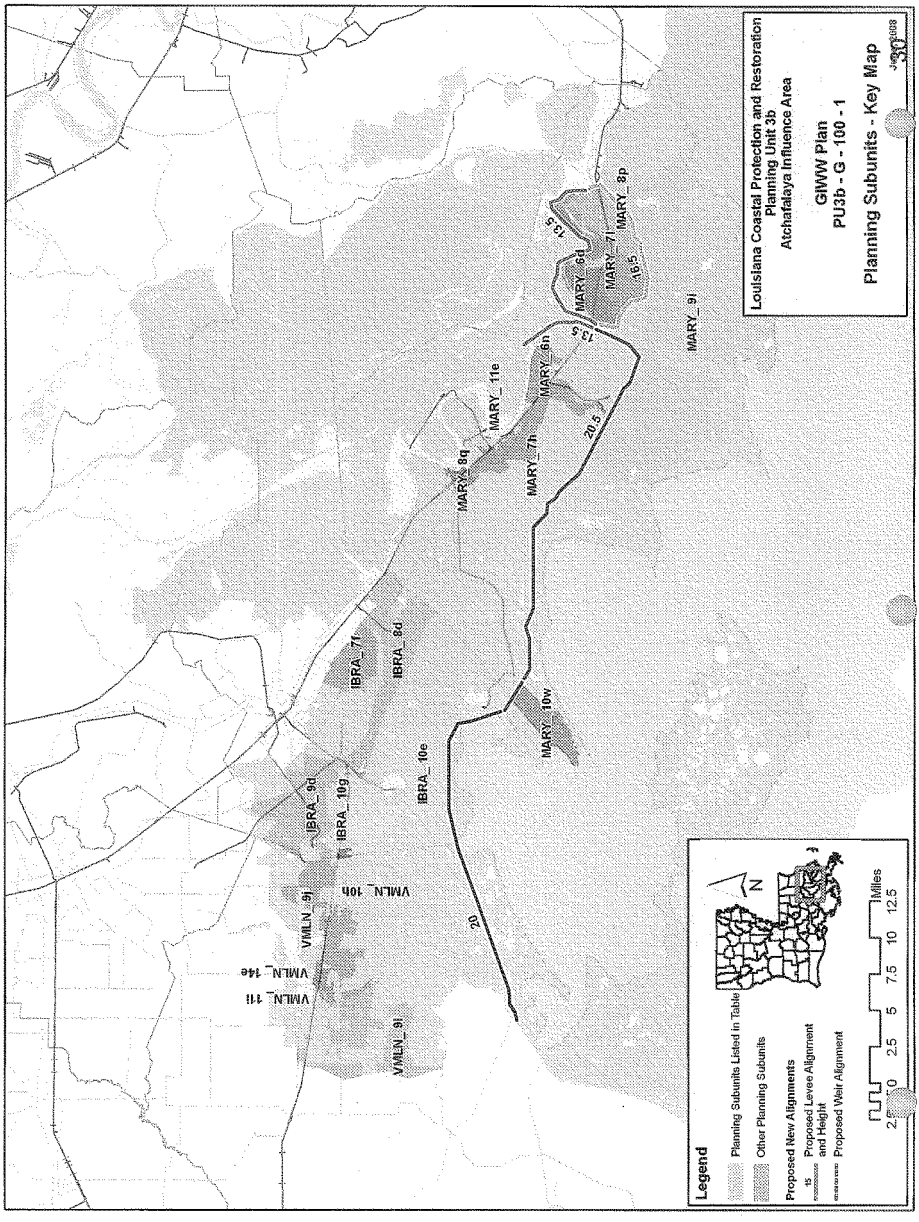
GIWW Alt

100-year Design

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels


Lafayette
Gonzales
Donaldsonville
Kaplan
New Iberia
Vacherie
Abbeville
Avery Island
Weeks Island
Franklin
Thibodaux
Morgan City
Patterson
Houma
Marsh Island
Legend
Primary Roads
Planning Unit Boundary
New Levees & Existing Levee Modifications
N
Miles
4 2 0 4 8 12 16 20
Louisiana Coastal Protection and Restoration
Planning Unit 3b
Atchafalaya Influence Area
GIWW Levee Plan
PU3b - G - 100 - 1
(100 - Year Design Level)
November 2007

1954


Louisiana Coastal Protection and Restoration
Planning Unit 3b
Atchafalaya Influence Area
GIWW Plan
PU3b - G - 100 - 1
Planning Subunits - Key Map
Legend
Planning Subunits Listed in Table
Other Planning Subunits
Proposed New Alignments
Proposed Levee Alignment and Height
Proposed Weir Alignment
Miles
MARY_8p
MARY_7l
MARY_6d
MARY_6n
MARY_11e
MARY_8q
MARY_7h
MARY_9i
MARY_10w
IBRA_7f
IBRA_8d
IBRA_10e
IBRA_9d
IBRA_10g
VMLN_10h
VMLN_9j
VMLN_14e
VMLN_11i
VMLN_9l
13.5
16.5
20.5
20

Alternative: PU3b-G-100-1
Water Surface Elevations (feet - NAVD88 2004.65)

Planning Sub Unit	2010 (Base) Conditions						2060 (Future) Conditions					
	100-yr Event		400-year Event		1,000-yr Event		100-yr Event		400-year Event		1,000-yr Event	
	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project
IBRA_10e	11.6	2.4	15.5	3.9	18.0	8.2	14.8	2.4	18.7	3.9	21.2	8.2
IBRA_10g	11.5	2.4	15.4	3.9	17.8	8.2	14.7	2.4	18.6	3.9	21.0	8.2
IBRA_7f	8.1	2.4	11.3	3.9	14.5	8.2	11.3	2.4	14.5	3.9	17.7	8.2
IBRA_8d	10.1	2.4	15.2	3.9	19.1	8.2	13.3	2.4	18.4	3.9	22.3	8.2
IBRA_9d	9.0	2.4	13.8	3.9	17.1	8.2	12.2	2.4	17.0	3.9	20.3	8.2
MARY_10w	11.7	13.6	16.0	19.0	17.9	22.7	13.9	16.8	17.6	22.2	20.0	25.9
MARY_11e	7.8	1.3	11.3	3.5	14.1	9.1	11.0	1.3	14.5	3.5	17.3	9.1
MARY_6d	7.8	-0.4	9.6	3.5	12.0	10.8	11.0	-0.4	12.8	3.5	15.2	10.8
MARY_6n	7.9	1.3	13.9	3.5	14.8	9.1	11.1	1.3	17.1	3.5	18.0	9.1
MARY_7h	7.8	1.3	10.9	3.5	13.2	9.1	11.0	1.3	14.1	3.5	16.4	9.1
MARY_7l	7.8	-0.4	10.6	3.5	13.1	10.8	11.0	-0.4	13.8	3.5	16.3	10.8
MARY_8p	8.6	-0.4	12.4	3.5	14.8	10.8	11.8	-0.4	15.6	3.5	18.0	10.8
MARY_8q	8.2	1.3	13.5	3.5	17.2	9.1	11.4	1.3	16.7	3.5	20.4	9.1
MARY_9i	9.9	10.6	13.4	14.6	15.4	16.8	13.1	13.8	16.6	17.8	18.6	20.0
VMLN_10h	11.4	2.4	15.6	3.9	18.3	8.2	14.6	2.4	18.8	3.9	21.5	8.2
VMLN_11i	7.8	2.4	11.3	3.9	14.8	8.2	11.0	2.4	14.5	3.9	18.0	8.2
VMLN_14e	7.8	2.4	9.4	3.9	14.3	8.2	11.0	2.4	12.6	3.9	17.5	8.2
VMLN_9j	7.8	2.4	13.1	3.9	16.3	8.2	11.0	2.4	16.3	3.9	19.5	8.2
VMLN_9l	10.6	2.4	13.7	3.9	15.5	8.2	13.8	2.4	16.9	3.9	18.7	8.2
Evaluation Parameters	Confidence Level:			90%		Levee Design:			No Friction Waves			
	Future Relative Sea Level Rise:			3.2 feet		Levee Overtopping:			No Friction Waves			

1956

Planning Unit:	3b	Alt. No.:	PU3b-F-100-1	Category:	Coastal Restoration + Structural Measures
Alternative Description:	Sustain coastal landscape through restoration. Raise ring levee around Patterson/Berwick to 100-year design level and construct levee along the edge of development north of the GIWW to high ground west of Abbeville at the 100-year design level.				
Coastal Component:	R1	Nonstructural Component:			None
Structural Component:	See alternative description above.				

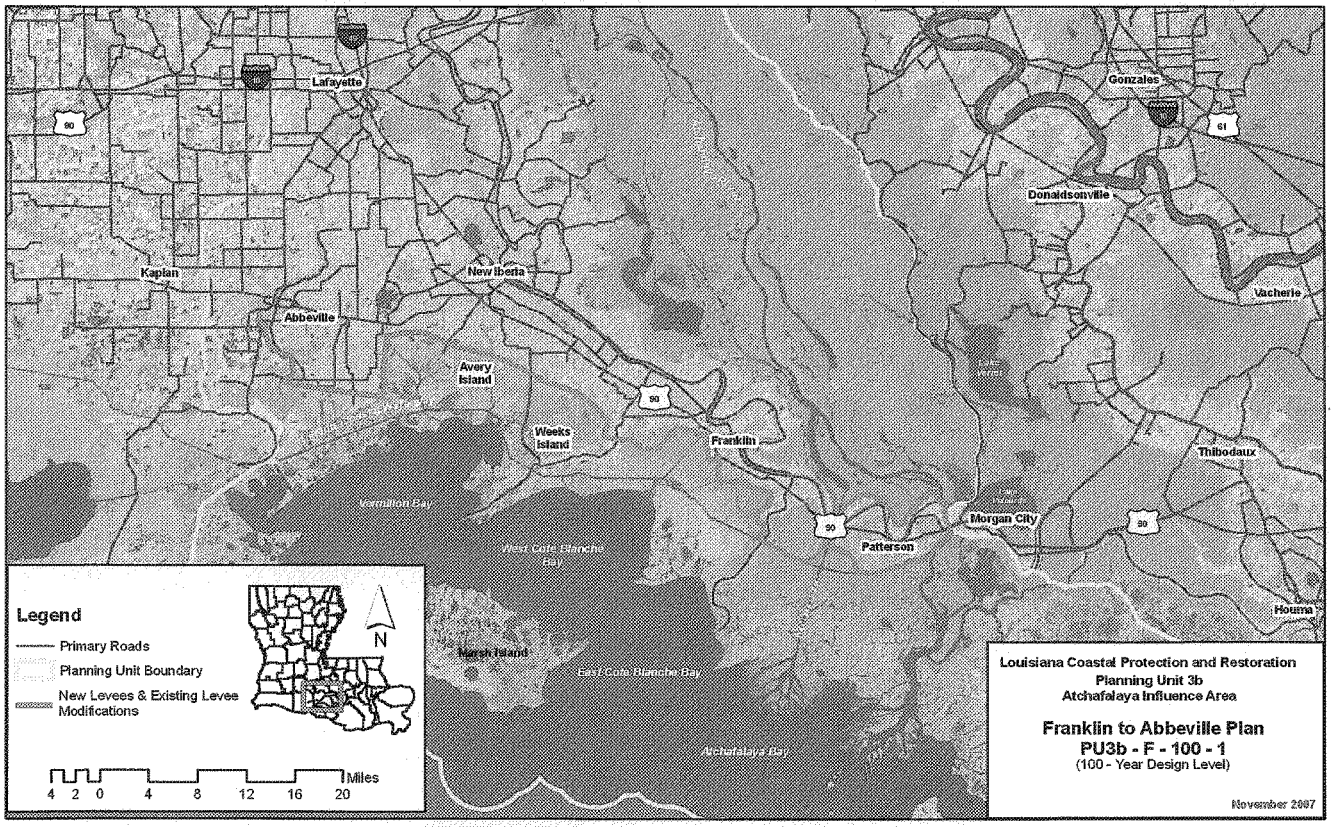
Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	954	1,958	107	126	546	29	202	16	3
		Mid		2,881	167	192	875	46	178	15	3
		Low		3,909	261	260	1,148	61	154	14	1
2	High RSLR High Employment Dispersed Population	High	958	2,059	115	60	569	31	202	16	3
		Mid		2,991	178	81	910	50	178	15	2
		Low		4,057	273	113	1,163	62	154	14	0
3	Low RSLR Business-as-Usual Compact Population	High	954	1,829	106	125	523	28	202	16	3
		Mid		2,729	165	191	835	45	178	15	3
		Low		3,734	254	255	1,067	57	154	14	1
4	High RSLR Business-as-Usual Compact Population	High	958	1,922	114	136	546	30	202	16	3
		Mid		2,836	175	203	859	47	178	15	2
		Low		3,869	265	264	1,088	59	154	14	0

Other Results			Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Construction Time (years)		10	After 50 yrs (% of baseline)	105	104	105	104
Direct Wetland Impacts (acres)		2,500	After 100 yrs (% of baseline)	105	100	105	100
Indirect Impacts (unitless)		2	Present Value of Life Cycle Costs ($ Millions)				
Spatial Integrity (unitless)		0.44	Coastal Component	4,756	4,796	4,756	4,796
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)	Nonstructural Component	0	0	0	0
	1 / 2	6,622	Structural Component	13,918	13,955	13,918	13,955
	3 / 4	6,622	Total Project	18,674	18,751	18,674	18,751

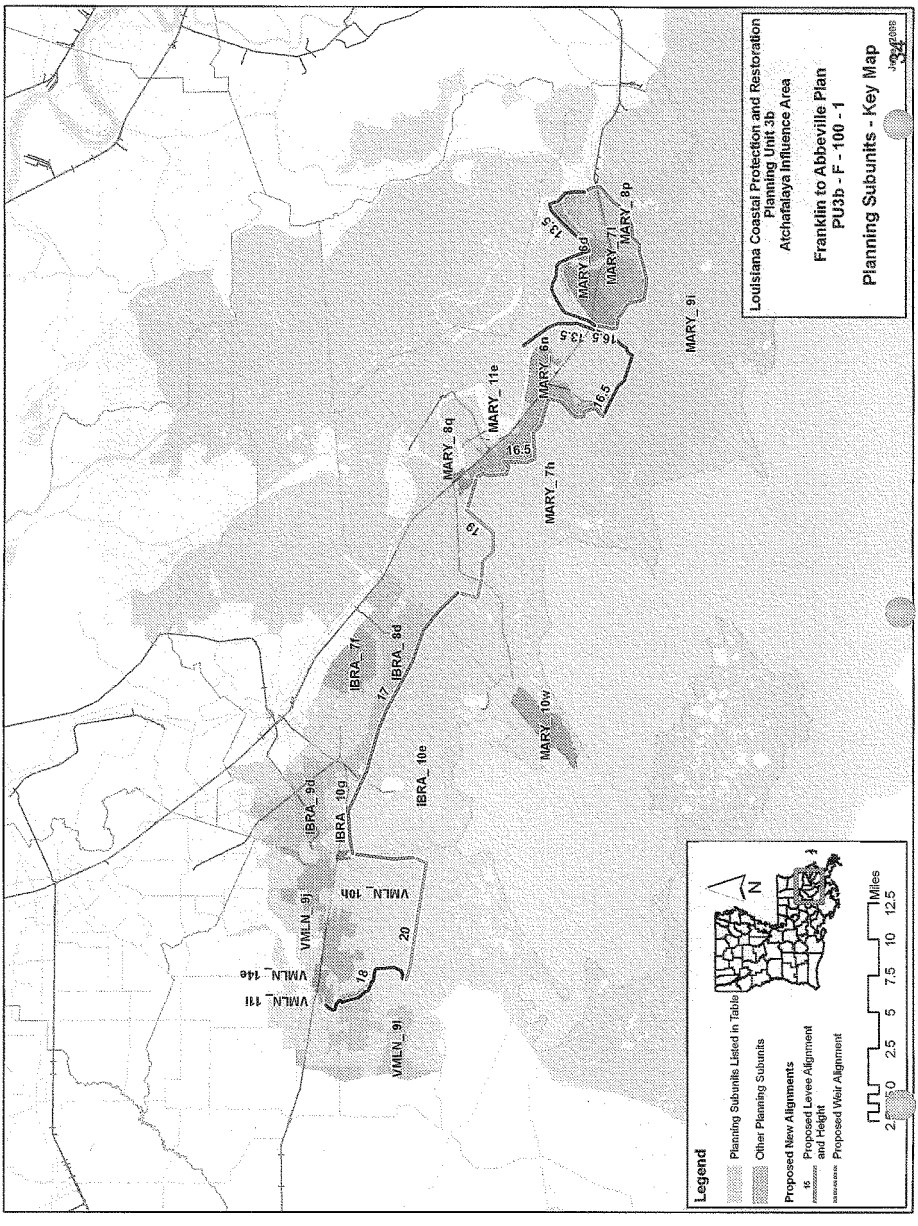
2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 3b
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	Structural Plan
10-year	1,024	222	1,523	282	1,013	223	1,543	285	Franklin to Abbeville Alt
100-year	4,254	713	5,717	879	4,148	636	5,447	750	
400-year	8,571	5,508	9,628	5,680	7,772	5,128	8,782	5,287	
1,000-year	11,203	10,913	11,827	11,013	10,886	10,668	11,680	10,828	100-year Design
2,000-year	12,281	11,431	12,591	11,510	12,370	11,339	12,769	11,416	

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels

1957


Lafayette
Gonzales
Donaldsonville
Kaplan
New Iberia
Vacherie
Abbeville
Avery Island
Weeks Island
Franklin
Thibodaux
Morgan City
Patterson
Houma
Vermilion Bay
West Cote Blanche Bay
Marsh Island
East Cote Blanche Bay
Atchafalaya Bay
Legend
Primary Roads
Planning Unit Boundary
New Levees & Existing Levee Modifications
N
Miles
4 2 0 4 8 12 16 20
Louisiana Coastal Protection and Restoration
Planning Unit 3b
Atchafalaya Influence Area
Franklin to Abbeville Plan
PU3b - F - 100 - 1
(100 - Year Design Level)
November 2007

1958


Louisiana Coastal Protection and Restoration
Planning Unit 3b
Atchafalaya Influence Area
Franklin to Abbeville Plan
PU3b - F - 100 - 1
Planning Subunits - Key Map
Legend
Planning Subunits Listed in Table
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Proposed Weir Alignment
Miles
MARY_9i
MARY_8p
MARY_7l
MARY_6d
MARY_6n
MARY_7h
MARY_10w
MARY_11e
MARY_8q
IBRA_10e
IBRA_8d
IBRA_7l
IBRA_10g
IBRA_9d
VMLN_9i
VMLN_10h
VMLN_11i
VMLN_14e

Alternative: PU3b-F-100-1

Water Surface Elevations (feet - NAVD88 2004.65)

Planning Sub Unit	2010 (Base) Conditions						2060 (Future) Conditions					
	100-yr Event		400-year Event		1,000-yr Event		100-yr Event		400-year Event		1,000-yr Event	
	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project
IBRA_10e	11.6	12.5	15.5	17.1	18.0	20.0	14.8	15.7	18.7	20.3	21.2	23.2
IBRA_10g	11.5	4.6	15.4	11.5	17.8	17.0	14.7	4.6	18.6	11.5	21.0	17.0
IBRA_7f	8.1	4.0	11.3	15.0	14.5	17.0	11.3	4.0	14.5	15.0	17.7	17.0
IBRA_8d	10.1	4.0	15.2	15.0	19.1	17.0	13.3	4.0	18.4	15.0	22.3	17.0
IBRA_9d	9.0	4.0	13.8	15.0	17.1	17.0	12.2	4.0	17.0	15.0	20.3	17.0
MARY_10w	11.7	11.9	16.0	16.2	17.9	19.2	13.9	15.1	17.6	19.4	20.0	22.4
MARY_11e	7.8	0.5	11.3	9.8	14.1	16.5	11.0	0.5	14.5	9.8	17.3	16.5
MARY_6d	7.8	-0.4	9.6	3.5	12.0	10.8	11.0	-0.4	12.8	3.5	15.2	10.8
MARY_6n	7.9	0.5	13.9	9.8	14.8	16.5	11.1	0.5	17.1	9.8	18.0	16.5
MARY_7h	7.8	0.5	10.9	9.8	13.2	16.5	11.0	0.5	14.1	9.8	16.4	16.5
MARY_7l	7.8	-0.4	10.6	3.5	13.1	10.8	11.0	-0.4	13.8	3.5	16.3	10.8
MARY_8p	8.6	-0.4	12.4	3.5	14.8	10.8	11.8	-0.4	15.6	3.5	18.0	10.8
MARY_8q	8.2	3.0	13.5	8.3	17.2	16.5	11.4	3.0	16.7	8.3	20.4	16.5
MARY_9i	9.9	10.5	13.4	14.2	15.4	16.4	13.1	13.7	16.6	17.4	18.6	19.6
VMLN_10h	11.4	4.6	15.6	11.5	18.3	17.0	14.6	4.6	18.8	11.5	21.5	17.0
VMLN_11i	7.8	4.6	11.3	11.5	14.8	17.0	11.0	4.6	14.5	11.5	18.0	17.0
VMLN_14e	7.8	4.6	9.4	11.5	14.3	17.0	11.0	4.6	12.6	11.5	17.5	17.0
VMLN_9j	7.8	4.6	13.1	11.5	16.3	17.0	11.0	4.6	16.3	11.5	19.5	17.0
VMLN_9l	10.6	10.9	13.7	12.5	15.5	14.0	13.8	14.1	16.9	15.7	18.7	17.2

Evaluation Parameters				
	Confidence Level:	90%	Levee Design:	No Friction Waves
	Future Relative Sea Level Rise:	3.2 feet	Levee Overtopping:	No Friction Waves

1960

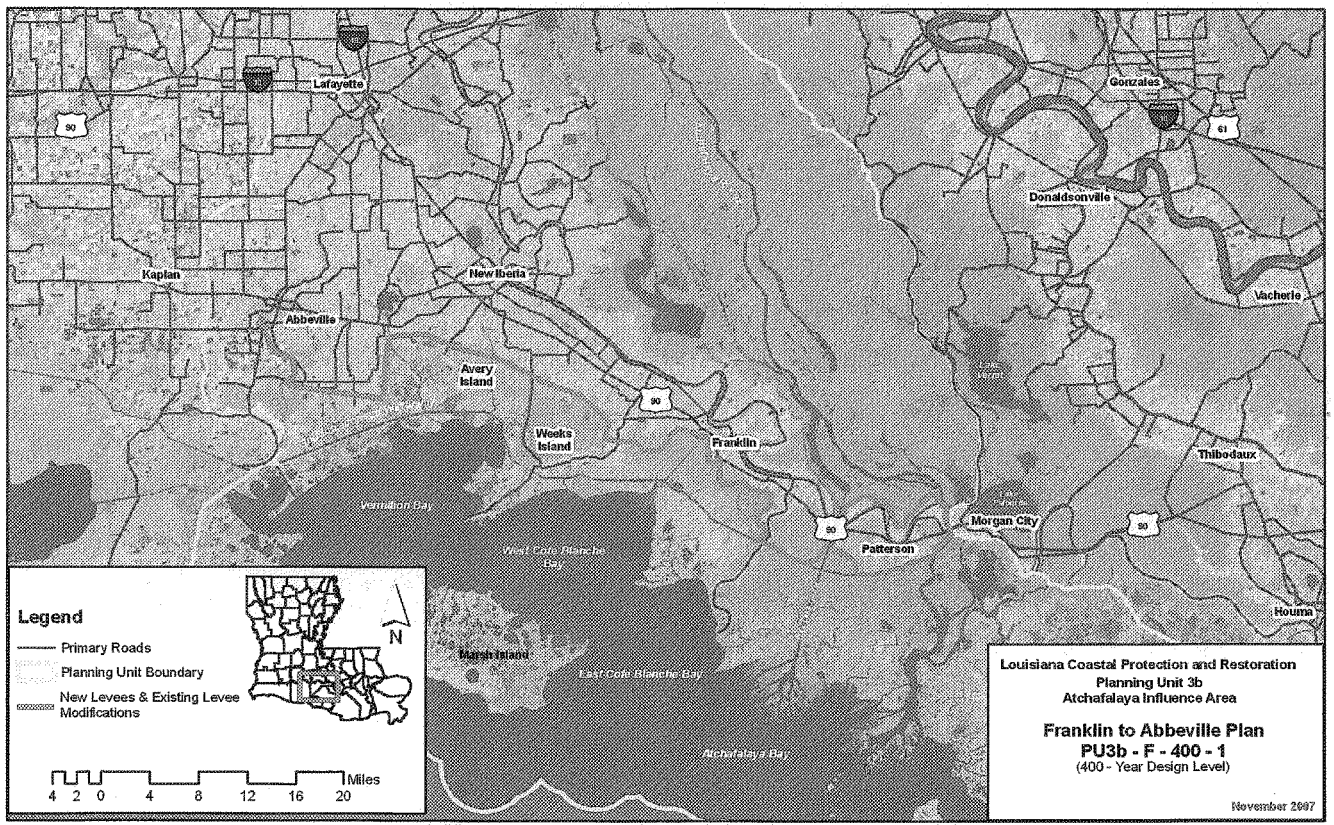
Planning Unit:	3b	Alt. No.:	PU3b-F-400-1	Category:	Coastal Restoration + Structural Measures
Alternative Description:	Sustain coastal landscape through restoration. Raise ring levee around Patterson/Berwick to 400-year design level and construct levee along the edge of development north of the GIWW to high ground west of Abbeville at the 400-year design level.				
Coastal Component:	R1		Nonstructural Component:		None
Structural Component:	See alternative description above.				

Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	1,440	2,146	114	140	598	32	202	19	5
		Mid		3,071	175	208	940	50	178	19	5
		Low		3,871	248	256	1,135	60	154	18	5
2	High RSLR High Employment Dispersed Population	High	1,452	2,264	123	67	628	35	202	19	5
		Mid		3,201	188	85	980	54	178	19	5
		Low		4,041	262	93	1,154	61	154	18	4
3	Low RSLR Business-as-Usual Compact Population	High	1,440	2,008	114	140	575	32	202	19	5
		Mid		2,914	173	206	899	49	178	19	5
		Low		3,692	242	253	1,074	57	154	18	5
4	High RSLR Business-as-Usual Compact Population	High	1,452	2,118	122	153	604	34	202	19	5
		Mid		3,040	185	222	930	52	178	19	5
		Low		3,849	255	264	1,099	59	154	18	4

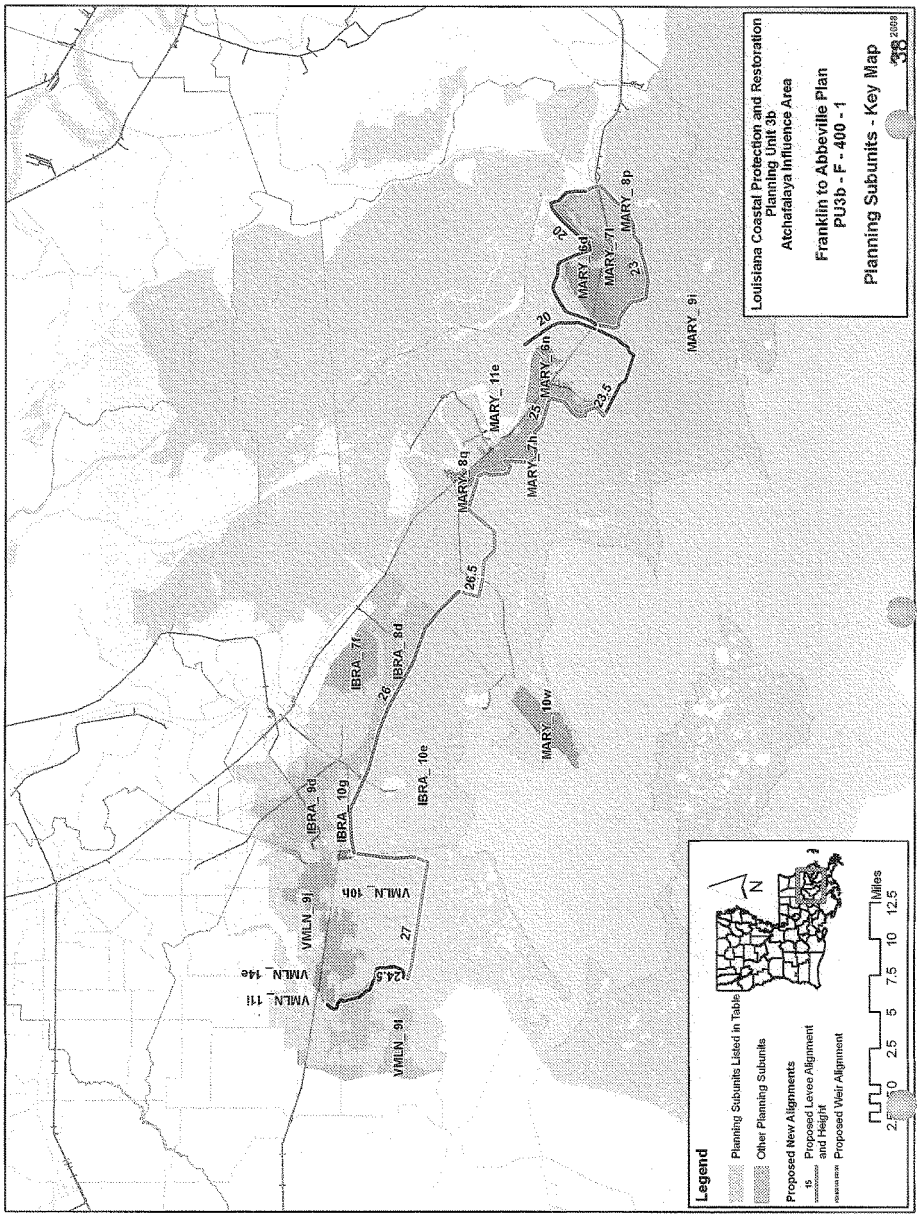
Other Results			Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Construction Time (years)		12	After 50 yrs (% of baseline)	105	104	105	104
Direct Wetland Impacts (acres)		3,900	After 100 yrs (% of baseline)	105	100	105	100
Indirect Impacts (unitless)		2	Present Value of Life Cycle Costs ($ Millions)				
Spatial Integrity (unitless)		0.44	Coastal Component	4,756	4,796	4,756	4,796
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)	Nonstructural Component	0	0	0	0
	1 / 2	9,958	Structural Component	23,445	23,639	23,445	23,639
	3 / 4	9,958	Total Project	28,200	28,436	28,200	28,436

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 3b
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		Structural Plan
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	Franklin to Abbeville Alt
10-year	1,024	222	1,523	282	1,013	223	1,543	285	400-year Design
100-year	4,254	711	5,717	876	4,148	633	5,447	747	
400-year	8,571	1,238	9,628	1,409	7,772	985	8,782	1,145	
1,000-year	11,203	1,679	11,827	1,778	10,886	1,462	11,680	1,621	
2,000-year	12,281	2,167	12,591	2,246	12,370	2,034	12,769	2,112	

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price level


Lafayette
Gonzales
Donaldsonville
Kaplan
New Iberia
Vacherie
Abbeville
Avery Island
Weeks Island
Franklin
Thibodaux
Morgan City
Patterson
Houma
West Cote Blanche Bay
Marsh Island
Atchafalaya Bay
Legend
Primary Roads
Planning Unit Boundary
New Levees & Existing Levee Modifications
N
Miles
4 2 0 4 8 12 16 20
Louisiana Coastal Protection and Restoration
Planning Unit 3b
Atchafalaya Influence Area
Franklin to Abbeville Plan
PU3b - F - 400 - 1
(400 - Year Design Level)
November 2007

1962


Louisiana Coastal Protection and Restoration
Planning Unit 3b
Atchafalaya Influence Area
Franklin to Abbeville Plan
PU3b - F - 400 - 1
Planning Subunits - Key Map
38
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Planning Subunits Listed in Table
Other Planning Subunits
Proposed New Alignments
15 Proposed Levee Alignment and Height
Proposed Weir Alignment
Miles
2.5 0 2.5 5 7.5 10 12.5
N
VMLN_9i
VMLN_10h
VMLN_11i
VMLN_14e
IBRA_9d
IBRA_10g
IBRA_7f
IBRA_8d
IBRA_10e
MARY_8q
MARY_11e
MARY_7n
MARY_8n
MARY_10w
MARY_9i
MARY_6d
MARY_7l
MARY_8p
27
24.5
26
26.5
23
23.5
20

Alternative: PU3b-F-400-1

Water Surface Elevations (feet - NAVD88 2004.65)

Planning Sub Unit	2010 (Base) Conditions						2060 (Future) Conditions					
	100-yr Event		400-year Event		1,000-yr Event		100-yr Event		400-year Event		1,000-yr Event	
	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project
IBRA_10e	11.6	12.5	15.5	17.1	18.0	20.0	14.8	15.7	18.7	20.3	21.2	23.2
IBRA_10g	11.5	4.3	15.4	4.5	17.8	5.6	14.7	4.3	18.6	4.5	21.0	5.6
IBRA_7f	8.1	3.9	11.3	4.0	14.5	5.3	11.3	3.9	14.5	4.0	17.7	5.3
IBRA_8d	10.1	3.9	15.2	4.0	19.1	5.3	13.3	3.9	18.4	4.0	22.3	5.3
IBRA_9d	9.0	3.9	13.8	4.0	17.1	5.3	12.2	3.9	17.0	4.0	20.3	5.3
MARY_10w	11.7	11.9	16.0	16.2	17.9	19.2	13.9	15.1	17.6	19.4	20.0	22.4
MARY_11e	7.8	0.2	11.3	0.4	14.1	1.5	11.0	0.2	14.5	0.4	17.3	1.5
MARY_6d	7.8	-0.6	9.6	-0.5	12.0	0.1	11.0	-0.6	12.8	-0.5	15.2	0.1
MARY_6n	7.9	0.2	13.9	0.4	14.8	1.5	11.1	0.2	17.1	0.4	18.0	1.5
MARY_7h	7.8	0.2	10.9	0.4	13.2	1.5	11.0	0.2	14.1	0.4	16.4	1.5
MARY_7l	7.8	-0.6	10.6	-0.5	13.1	0.1	11.0	-0.6	13.8	-0.5	16.3	0.1
MARY_8p	8.6	-0.6	12.4	-0.5	14.8	0.1	11.8	-0.6	15.6	-0.5	18.0	0.1
MARY_8q	8.2	2.8	13.5	3.0	17.2	3.6	11.4	2.8	16.7	3.0	20.4	3.6
MARY_9i	9.9	10.5	13.4	14.2	15.4	16.4	13.1	13.7	16.6	17.4	18.6	19.6
VMLN_10h	11.4	4.3	15.6	4.5	18.3	5.6	14.6	4.3	18.8	4.5	21.5	5.6
VMLN_11i	7.8	4.3	11.3	4.5	14.8	5.6	11.0	4.3	14.5	4.5	18.0	5.6
VMLN_14e	7.8	4.3	9.4	4.5	14.3	5.6	11.0	4.3	12.6	4.5	17.5	5.6
VMLN_9j	7.8	4.3	13.1	4.5	16.3	5.6	11.0	4.3	16.3	4.5	19.5	5.6
VMLN_9l	10.6	10.9	13.7	12.5	15.5	14.0	13.8	14.1	16.9	15.7	18.7	17.2

Evaluation Parameters				
	Confidence Level:	90%	Levee Design:	No Friction Waves
	Future Relative Sea Level Rise:	3.2 feet	Levee Overtopping:	No Friction Waves

1964

Planning Unit:	3b	Alt. No.:	PU3b-F-1000-1	Category:	Coastal Restoration + Structural Measures
Alternative Description:	Sustain coastal landscape through restoration. Raise ring levee around Patterson/Berwick to 1000-year design level and construct levee along the edge of development north of the GIWW to high ground west of Abbeville at the 1000-year design level.				
Coastal Component:	R1	Nonstructural Component:		None	
Structural Component:	See alternative description above.				

Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	1,830	2,327	121	154	647	35	202	19	5
		Mid		3,340	188	229	1,023	55	178	19	5
		Low		4,201	267	282	1,236	66	154	18	5
2	High RSLR High Employment Dispersed Population	High	1,832	2,463	132	76	684	38	202	19	5
		Mid		3,492	202	96	1,069	60	178	19	5
		Low		4,394	283	106	1,259	67	154	18	4
3	Low RSLR Business-as-Usual Compact Population	High	1,830	2,178	121	154	624	35	202	19	5
		Mid		3,172	186	229	981	54	178	19	5
		Low		4,011	261	280	1,173	63	154	18	5
4	High RSLR Business-as-Usual Compact Population	High	1,832	2,307	131	170	659	38	202	19	5
		Mid		3,319	199	247	1,019	57	178	19	5
		Low		4,191	275	294	1,204	66	154	18	4

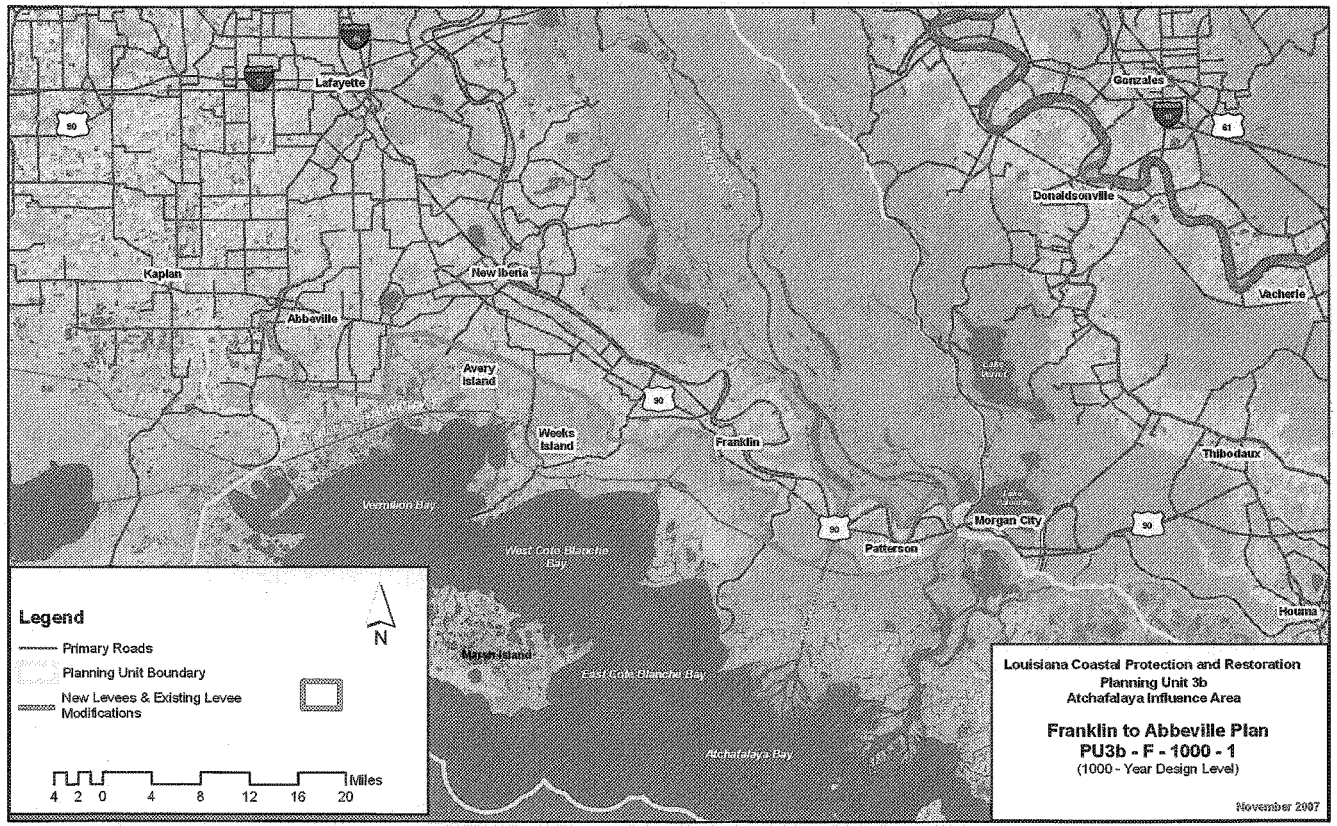
Other Results	
Construction Time (years)	14
Direct Wetland Impacts (acres)	5,200
Indirect Impacts (unitless)	2
Spatial Integrity (unitless)	0.44

Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)	
	1 / 2	12,618	12,637
	3 / 4	12,618	12,637

Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
After 50 yrs (% of baseline)	105	104	105	104
After 100 yrs (% of baseline)	105	100	105	100
Present Value of Life Cycle Costs ($ Millions)				
Coastal Component	4,756	4,796	4,756	4,796
Nonstructural Component	0	0	0	0
Structural Component	31,074	31,087	31,074	31,087
Total Project	35,830	35,884	35,830	35,884

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 3b
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	
10-year	1,024	222	1,523	282	1,013	223	1,543	285	Structural Plan
100-year	4,254	711	5,717	876	4,148	633	5,447	747	Franklin to Abbeville Alt
400-year	8,571	1,236	9,628	1,408	7,772	983	8,782	1,143	
1,000-year	11,203	1,652	11,827	1,751	10,886	1,433	11,680	1,593	1000-year Design
2,000-year	12,281	1,844	12,591	1,922	12,370	1,696	12,769	1,773	

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price level.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Weeks Island
Franklin
Thibodaux
Morgan City
Patterson
Houma
Vermilion Bay
West Cote Blanche Bay
East Cote Blanche Bay
Marsh Island
Atchafalaya Bay
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N
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4 2 0 4 8 12 16 20
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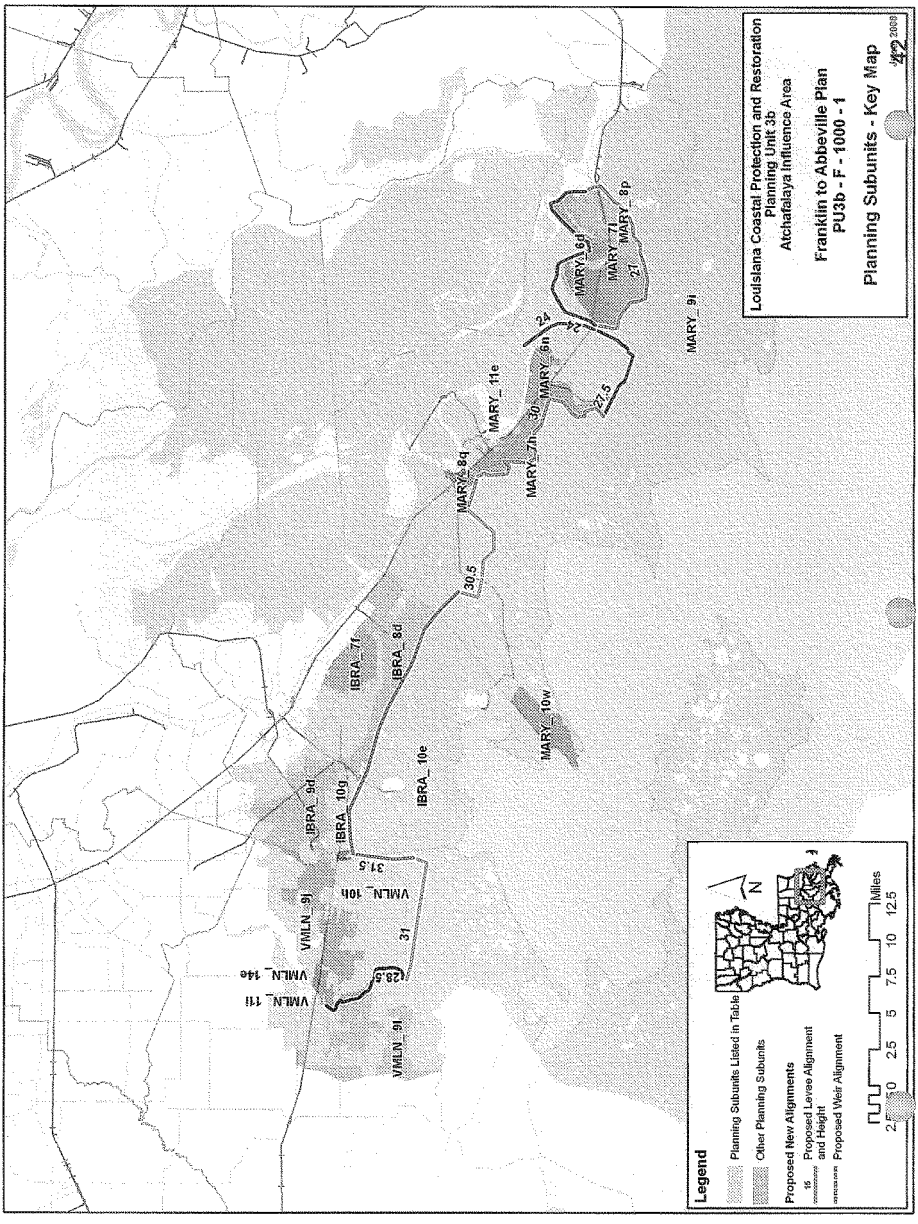
Planning Unit 3b
Atchafalaya Influence Area
Franklin to Abbeville Plan
PU3b - F - 1000 - 1
(1000 - Year Design Level)
November 2007

1966


Louisiana Coastal Protection and Restoration
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PU3b - F - 1000 - 1
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Legend
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Proposed Levee Alignment and Height
Proposed Weir Alignment
Miles
2.5 0 2.5 5 7.5 10 12.5
N
IBRA_9d
IBRA_10g
IBRA_7i
IBRA_8d
IBRA_10e
VMLN_9i
VMLN_10h
VMLN_14e
VMLN_11i
VMLN_9i
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31
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MARY_8q
MARY_11e
MARY_7n
MARY_10w
MARY_8n
MARY_6d
MARY_7i
MARY_8p
MARY_9i
30
27.5
24
21

Alternative: PU3b-F-1000-1

Water Surface Elevations (feet - NAVD88 2004.65)

Planning Sub Unit	2010 (Base) Conditions						2060 (Future) Conditions					
	100-yr Event		400-year Event		1,000-yr Event		100-yr Event		400-year Event		1,000-yr Event	
	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project
IBRA_10e	11.6	12.5	15.5	17.1	18.0	20.0	14.8	15.7	18.7	20.3	21.2	23.2
IBRA_10g	11.5	4.3	15.4	4.3	17.8	4.5	14.7	4.3	18.6	4.3	21.0	4.5
IBRA_7f	8.1	3.9	11.3	3.9	14.5	4.0	11.3	3.9	14.5	3.9	17.7	4.0
IBRA_8d	10.1	3.9	15.2	3.9	19.1	4.0	13.3	3.9	18.4	3.9	22.3	4.0
IBRA_9d	9.0	3.9	13.8	3.9	17.1	4.0	12.2	3.9	17.0	3.9	20.3	4.0
MARY_10w	11.7	11.9	16.0	16.2	17.9	19.2	13.9	15.1	17.6	19.4	20.0	22.4
MARY_11e	7.8	0.2	11.3	0.2	14.1	0.4	11.0	0.2	14.5	0.2	17.3	0.4
MARY_6d	7.8	-0.6	9.6	-0.6	12.0	-0.5	11.0	-0.6	12.8	-0.6	15.2	-0.5
MARY_6n	7.9	0.2	13.9	0.2	14.8	0.4	11.1	0.2	17.1	0.2	18.0	0.4
MARY_7h	7.8	0.2	10.9	0.2	13.2	0.4	11.0	0.2	14.1	0.2	16.4	0.4
MARY_7l	7.8	-0.6	10.6	-0.6	13.1	-0.5	11.0	-0.6	13.8	-0.6	16.3	-0.5
MARY_8p	8.6	-0.6	12.4	-0.6	14.8	-0.5	11.8	-0.6	15.6	-0.6	18.0	-0.5
MARY_8q	8.2	2.8	13.5	2.9	17.2	3.0	11.4	2.8	16.7	2.9	20.4	3.0
MARY_9i	9.9	10.5	13.4	14.2	15.4	16.4	13.1	13.7	16.6	17.4	18.6	19.6
VMLN_10h	11.4	4.3	15.6	4.3	18.3	4.5	14.6	4.3	18.8	4.3	21.5	4.5
VMLN_11i	7.8	4.3	11.3	4.3	14.8	4.5	11.0	4.3	14.5	4.3	18.0	4.5
VMLN_14e	7.8	4.3	9.4	4.3	14.3	4.5	11.0	4.3	12.6	4.3	17.5	4.5
VMLN_9j	7.8	4.3	13.1	4.3	16.3	4.5	11.0	4.3	16.3	4.3	19.5	4.5
VMLN_9l	10.6	10.9	13.7	12.5	15.5	14.0	13.8	14.1	16.9	15.7	18.7	17.2

Evaluation Parameters				
	Confidence Level:	90%	Levee Design:	No Friction Waves
	Future Relative Sea Level Rise:	3.2 feet	Levee Overtopping:	No Friction Waves

1968

Planning Unit:	3b	Alt. No.:	PU3b-RL-100-1	Category:	Coastal Restoration + Structural Measures
Alternative Description:	Sustain coastal landscape through restoration. Raise ring levee around Patterson/Berwick to 100-year design level and construct ring levees around Franklin/Baldwin, New Iberia, Erath, Delcambre, and Abbeville at the 100-year design level.				
Coastal Component:	R1		Nonstructural Component:		None
Structural Component:	See alternative description above.				

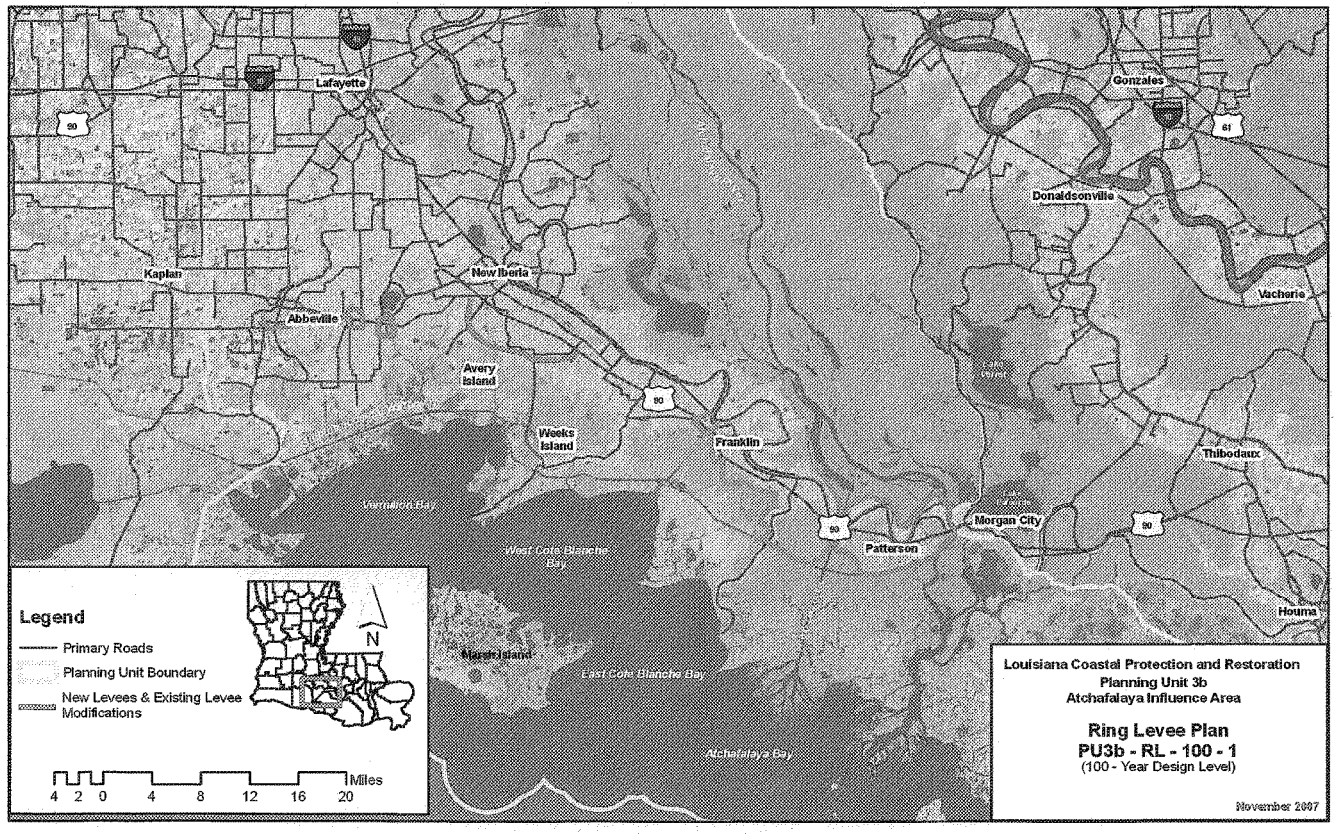
Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands							
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	834	2,785	132	159	615	34	171	15	3
		Mid		3,885	205	234	974	54	147	12	3
		Low		5,093	303	297	1,221	66	123	11	0
2	High RSLR High Employment Dispersed Population	High	838	2,959	146	101	664	39	171	13	3
		Mid		4,104	226	130	1,025	59	147	12	1
		Low		5,385	327	155	1,252	69	123	8	0
3	Low RSLR Business-as-Usual Compact Population	High	834	2,565	131	158	587	33	171	15	3
		Mid		3,644	203	233	925	52	147	12	3
		Low		4,811	296	295	1,141	63	123	11	0
4	High RSLR Business-as-Usual Compact Population	High	838	2,737	144	174	623	36	171	13	3
		Mid		3,848	221	252	966	56	147	12	1
		Low		5,088	316	307	1,174	66	123	8	0

Other Results		Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Construction Time (years)	10	After 50 yrs (% of baseline)	105	104	105	104
Direct Wetland Impacts (acres)	900	After 100 yrs (% of baseline)	105	100	105	100
Indirect Impacts (unitless)	2	Present Value of Life Cycle Costs ($ Millions)				
Spatial Integrity (unitless)	0.44	Coastal Component	4,756	4,796	4,756	4,796
Non-Federal Share of Present Value of Life Cycle Costs	Scenario / ($ Millions)	Nonstructural Component	0	0	0	0
	1 / 2: 5,890 / 5,916	Structural Component	11,579	11,612	11,579	11,612
	3 / 4: 5,890 / 5,916	Total Project	16,335	16,408	16,335	16,408

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 3b
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	Structural Plan
10-year	1,024	316	1,523	453	1,013	315	1,543	456	Ring Levee Alt
100-year	4,254	1,664	5,717	2,321	4,148	1,564	5,447	2,055	
400-year	8,571	6,800	9,628	7,302	7,772	6,294	8,782	6,694	100-year Design
1,000-year	11,203	9,637	11,827	9,951	10,886	9,032	11,680	9,388	
2,000-year	12,281	10,525	12,591	10,723	12,370	10,107	12,769	10,340	

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels.

1969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Weeks Island
Franklin
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Morgan City
Patterson
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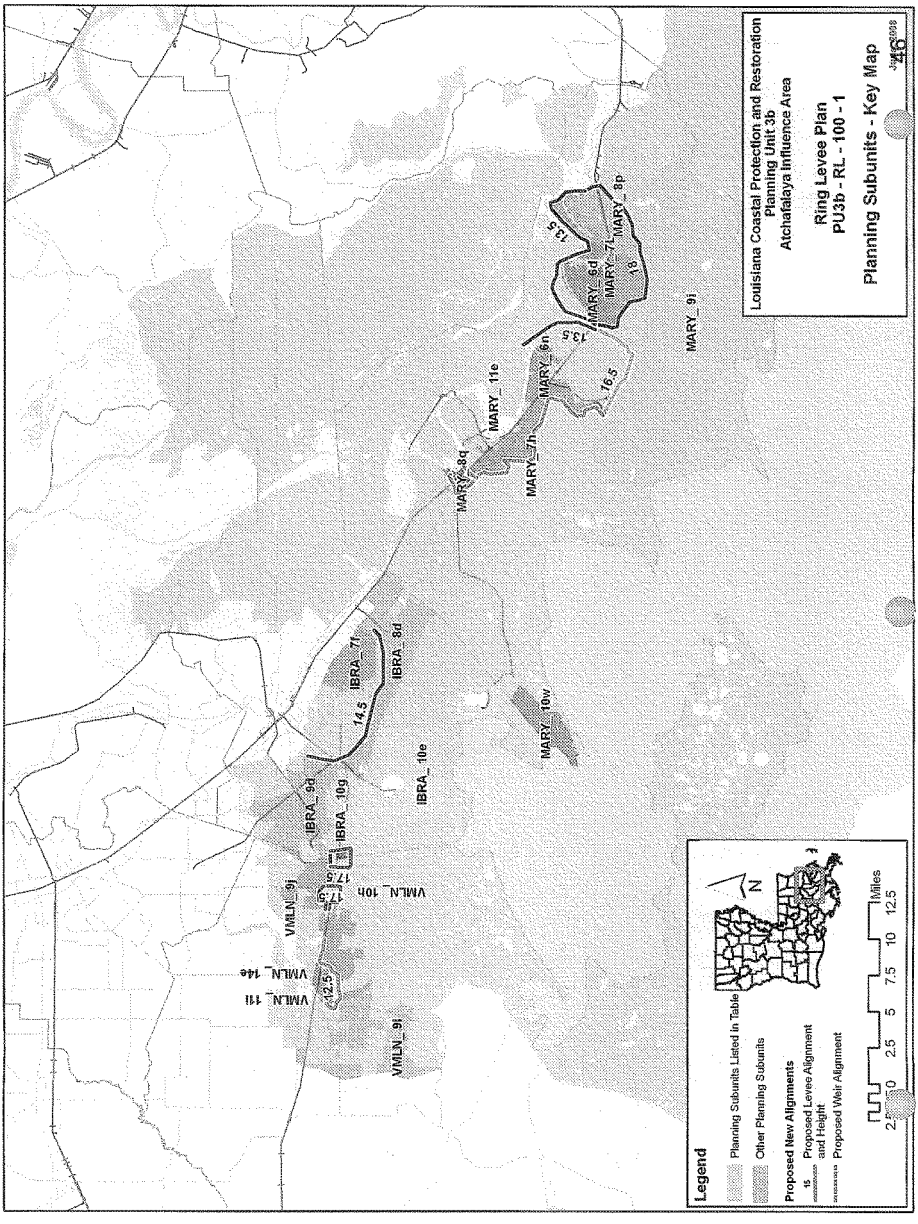
Atchafalaya Influence Area
Ring Levee Plan
PU3b - RL - 100 - 1
(100 - Year Design Level)
November 2007

1970


Louisiana Coastal Protection and Restoration
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Proposed Weir Alignment
Miles
2.5 0 2.5 5 7.5 10 12.5
N
IBRA_7l
IBRA_8d
IBRA_9d
IBRA_10g
IBRA_10e
VMLN_9i
VMLN_10h
VMLN_11i
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MARY_8q
MARY_11e
MARY_7h
MARY_6n
MARY_10w
MARY_9i
MARY_6d
MARY_7l
MARY_8p
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12.5
13.5
16
76.5

Alternative: PU3b-RL-100-1

Water Surface Elevations (feet - NAVD88 2004.65)

Planning Sub Unit	2010 (Base) Conditions						2060 (Future) Conditions					
	100-yr Event		400-year Event		1,000-yr Event		100-yr Event		400-year Event		1,000-yr Event	
	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project
IBRA_10e	11.6	11.6	15.5	15.5	18.0	18.0	14.8	14.8	18.7	18.7	21.2	21.2
IBRA_10g	11.5	5.4	15.4	17.5	17.8	17.5	14.7	5.4	18.6	17.5	21.0	17.5
IBRA_7f	8.1	6.3	11.3	14.5	14.5	14.5	11.3	6.3	14.5	14.5	17.7	14.5
IBRA_8d	10.1	10.1	15.2	15.2	19.1	19.1	13.3	13.3	18.4	18.4	22.3	22.3
IBRA_9d	9.0	9.0	13.8	13.8	17.1	17.1	12.2	12.2	17.0	17.0	20.3	20.3
MARY_10w	11.7	11.7	16.0	16.0	17.9	17.9	13.9	14.9	17.6	19.2	20.0	21.1
MARY_11e	7.8	0.5	11.3	9.8	14.1	16.5	11.0	0.5	14.5	9.8	17.3	16.5
MARY_6d	7.8	-0.4	9.6	3.5	12.0	10.8	11.0	-0.4	12.8	3.5	15.2	10.8
MARY_6n	7.9	0.5	13.9	9.8	14.8	16.5	11.1	0.5	17.1	9.8	18.0	16.5
MARY_7h	7.8	0.5	10.9	9.8	13.2	16.5	11.0	0.5	14.1	9.8	16.4	16.5
MARY_7l	7.8	-0.4	10.6	3.5	13.1	10.8	11.0	-0.4	13.8	3.5	16.3	10.8
MARY_8p	8.6	-0.4	12.4	3.5	14.8	10.8	11.8	-0.4	15.6	3.5	18.0	10.8
MARY_8q	8.2	5.2	13.5	16.5	17.2	16.5	11.4	5.2	16.7	16.5	20.4	16.5
MARY_9i	9.9	9.9	13.4	13.4	15.4	15.4	13.1	13.1	16.6	16.6	18.6	18.6
VMLN_10h	11.4	6.5	15.6	17.5	18.3	17.5	14.6	6.5	18.8	17.5	21.5	17.5
VMLN_11i	7.8	9.3	11.3	12.5	14.8	12.5	11.0	9.3	14.5	12.5	18.0	12.5
VMLN_14e	7.8	9.3	9.4	12.5	14.3	12.5	11.0	9.3	12.6	12.5	17.5	12.5
VMLN_9j	7.8	7.8	13.1	13.1	16.3	16.3	11.0	11.0	16.3	16.3	19.5	19.5
VMLN_9l	10.6	10.6	13.7	13.7	15.5	15.5	13.8	13.8	16.9	16.9	18.7	18.7

Evaluation Parameters				
	Confidence Level:	90%	Levee Design:	No Friction Waves
	Future Relative Sea Level Rise:	3.2 feet	Levee Overtopping:	No Friction Waves

1972

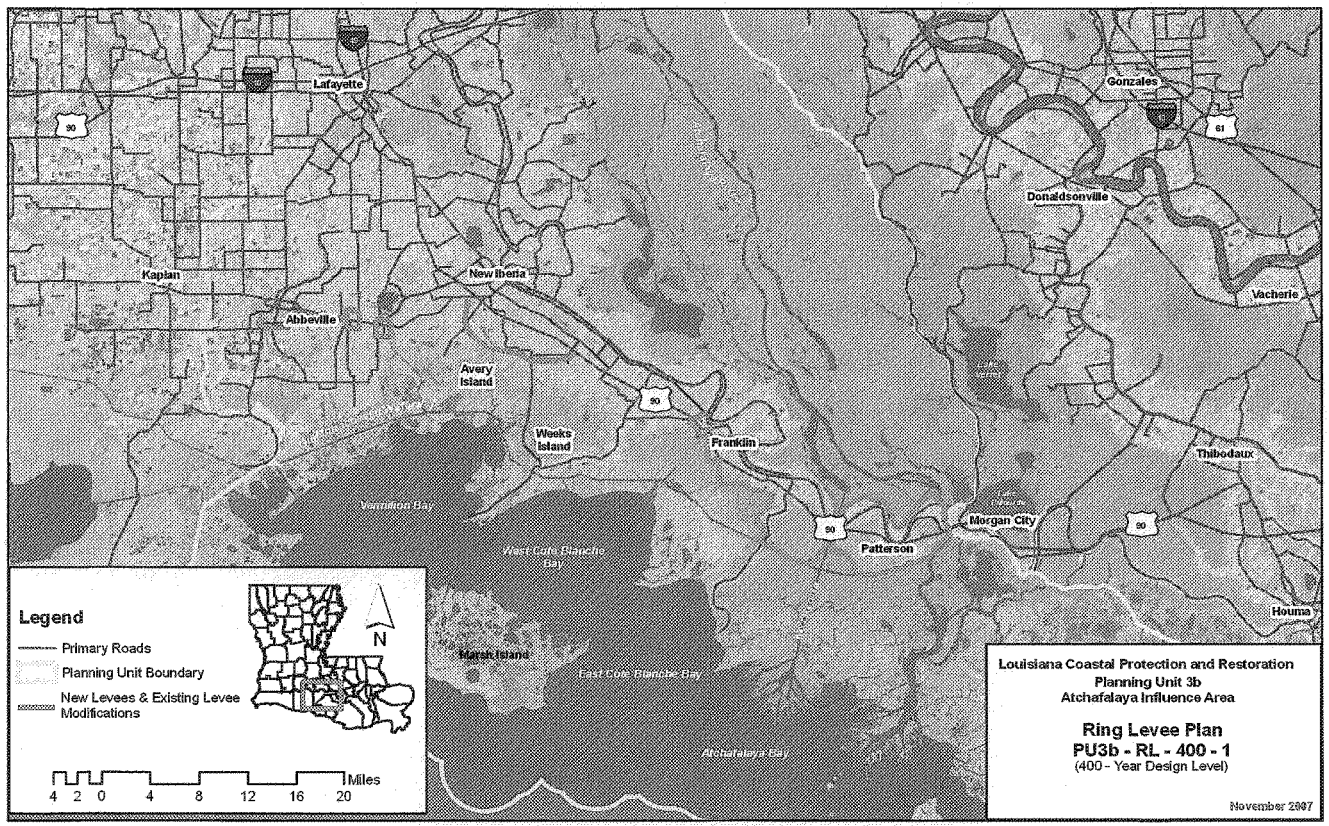
Planning Unit:	3b	Alt. No.:	PU3b-RL-400-1	Category:	Coastal Restoration + Structural Measures
Alternative Description:	Sustain coastal landscape through restoration. Raise ring levee around Patterson/Berwick to 400-year design level and construct ring levees around Franklin/Baldwin, New Iberia, Erath, Delcambre, and Abbeville at the 400-year design level.				
Coastal Component:	R1			Nonstructural Component:	None
Structural Component:	See alternative description above.				

Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands							
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	1,162	2,842	134	165	646	36	171	17	3
		Mid		3,943	207	239	1,009	56	147	16	3
		Low		4,988	299	297	1,238	67	123	15	3
2	High RSLR High Employment Dispersed Population	High	1,165	3,027	150	100	698	41	171	15	3
		Mid		4,174	229	121	1,064	61	147	15	3
		Low		5,289	324	139	1,272	70	123	13	2
3	Low RSLR Business-as-Usual Compact Population	High	1,162	2,616	134	164	618	35	171	17	3
		Mid		3,695	204	237	960	54	147	16	3
		Low		4,698	290	294	1,163	64	123	15	3
4	High RSLR Business-as-Usual Compact Population	High	1,165	2,799	148	182	658	39	171	15	3
		Mid		3,911	223	259	1,006	58	147	15	3
		Low		4,986	311	308	1,200	67	123	13	2

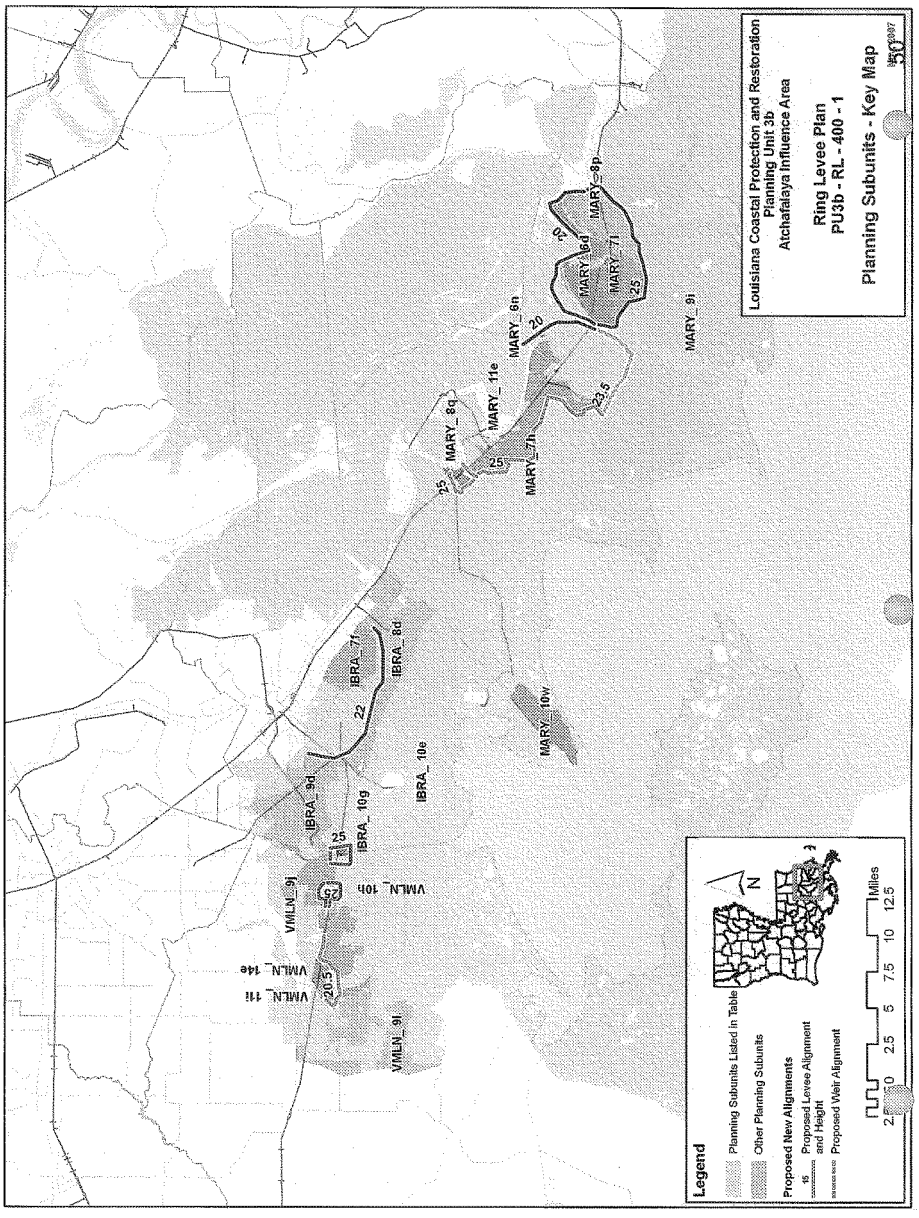
Other Results			Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Construction Time (years)		12	After 50 yrs (% of baseline)	105	104	105	104
Direct Wetland Impacts (acres)		1,700	After 100 yrs (% of baseline)	105	100	105	100
Indirect Impacts (unitless)		2	Present Value of Life Cycle Costs ($ Millions)				
Spatial Integrity (unitless)		0.44	Coastal Component	4,756	4,796	4,756	4,796
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)	Nonstructural Component	0	0	0	0
	1 / 2	8,142	Structural Component	17,996	18,024	17,996	18,024
	3 / 4	8,142	Total Project	22,752	22,820	22,752	22,820

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 3b
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	Structural Plan
10-year	1,024	316	1,523	453	1,013	315	1,543	456	Ring Levee Alt
100-year	4,254	1,628	5,717	2,284	4,148	1,526	5,447	2,017	
400-year	8,571	3,993	9,628	4,495	7,772	3,117	8,782	3,516	400-year Design
1,000-year	11,203	6,852	11,827	7,166	10,886	5,917	11,680	6,273	
2,000-year	12,281	9,058	12,591	9,256	12,370	8,573	12,769	8,807	

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels.


Lafayette
Gonzales
Donaldsonville
New Iberia
Kaplan
Abbeville
Vacherie
Avery Island
Weeks Island
Franklin
Thibodaux
Morgan City
Patterson
Houma
Marsh Island
Vermilion Bay
West Cote Blanche Bay
East Cote Blanche Bay
Atchafalaya Bay
Legend
Primary Roads
Planning Unit Boundary
New Levees & Existing Levee Modifications
N
Miles
4 2 0 4 8 12 16 20
Louisiana Coastal Protection and Restoration
Planning Unit 3b
Atchafalaya Influence Area
Ring Levee Plan
PU3b - RL - 400 - 1
(400 - Year Design Level)
November 2007

1974


Louisiana Coastal Protection and Restoration
Planning Unit 3b
Atchafalaya Influence Area
Ring Levee Plan
PU3b - RL - 400 - 1
Planning Subunits - Key Map
Legend
Planning Subunits Listed in Table
Other Planning Subunits
Proposed New Alignments
Proposed Levee Alignment and Height
Proposed Weir Alignment
Miles
N
MARY_9i
MARY_10v
MARY_7h
MARY_11e
MARY_8q
MARY_6n
MARY_8p
MARY_6d
MARY_7i
IBRA_8d
IBRA_7i
IBRA_10e
IBRA_9d
IBRA_10g
VMLN_10h
VMLN_9i
VMLN_14e
VMLN_11i

Alternative: PU3b-RL-400-1

Water Surface Elevations (feet - NAVD88 2004.65)

Planning Sub Unit	2010 (Base) Conditions						2060 (Future) Conditions					
	100-yr Event		400-year Event		1,000-yr Event		100-yr Event		400-year Event		1,000-yr Event	
	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project
IBRA_10e	11.6	11.6	15.5	15.5	18.0	18.0	14.8	14.8	18.7	18.7	21.2	21.2
IBRA_10g	11.5	3.7	15.4	5.5	17.8	10.5	14.7	3.7	18.6	5.5	21.0	10.5
IBRA_7f	8.1	6.0	11.3	6.2	14.5	8.4	11.3	6.0	14.5	6.2	17.7	8.4
IBRA_8d	10.1	10.1	15.2	15.2	19.1	19.1	13.3	13.3	18.4	18.4	22.3	22.3
IBRA_9d	9.0	9.0	13.8	13.8	17.1	17.1	12.2	12.2	17.0	17.0	20.3	20.3
MARY_10w	11.7	11.7	16.0	16.0	17.9	17.9	13.9	14.9	17.6	19.2	20.0	21.1
MARY_11e	7.8	0.2	11.3	0.4	14.1	1.5	11.0	0.2	14.5	0.4	17.3	1.5
MARY_6d	7.8	-0.6	9.6	-0.5	12.0	0.1	11.0	-0.6	12.8	-0.5	15.2	0.1
MARY_6n	7.9	0.2	13.9	0.4	14.8	1.5	11.1	0.2	17.1	0.4	18.0	1.5
MARY_7h	7.8	0.2	10.9	0.4	13.2	1.5	11.0	0.2	14.1	0.4	16.4	1.5
MARY_7l	7.8	-0.6	10.6	-0.5	13.1	0.1	11.0	-0.6	13.8	-0.5	16.3	0.1
MARY_8p	8.6	-0.6	12.4	-0.5	14.8	0.1	11.8	-0.6	15.6	-0.5	18.0	0.1
MARY_8q	8.2	3.9	13.5	4.7	17.2	9.6	11.4	3.9	16.7	4.7	20.4	9.6
MARY_9i	9.9	9.9	13.4	13.4	15.4	15.4	13.1	13.1	16.6	16.6	18.6	18.6
VMLN_10h	11.4	5.6	15.6	6.5	18.3	10.2	14.6	5.6	18.8	6.5	21.5	10.2
VMLN_11i	7.8	8.4	11.3	9.3	14.8	16.8	11.0	8.4	14.5	9.3	18.0	16.8
VMLN_14e	7.8	8.4	9.4	9.3	14.3	16.8	11.0	8.4	12.6	9.3	17.5	16.8
VMLN_9j	7.8	7.8	13.1	13.1	16.3	16.3	11.0	11.0	16.3	16.3	19.5	19.5
VMLN_9l	10.6	10.6	13.7	13.7	15.5	15.5	13.8	13.8	16.9	16.9	18.7	18.7

Evaluation Parameters				
	Confidence Level:	90%	Levee Design:	No Friction Waves
	Future Relative Sea Level Rise:	3.2 feet	Levee Overtopping:	No Friction Waves

1976

Planning Unit:	3b	Alt. No.:	PU3b-C-G-100-1	Category:	Comprehensive (Coastal+Structural+Nonstructural)
Alternative Description:	Comprehensive plan--Same coastal and structural measures as Alternative PU3b-G-100-1 but with complementary nonstructural measures to reduce residual risk.				
Coastal Component:	R1		Nonstructural Component:		100-yr complementary measures
Structural Component:	Same as Alternative PU3b-G-100-1				

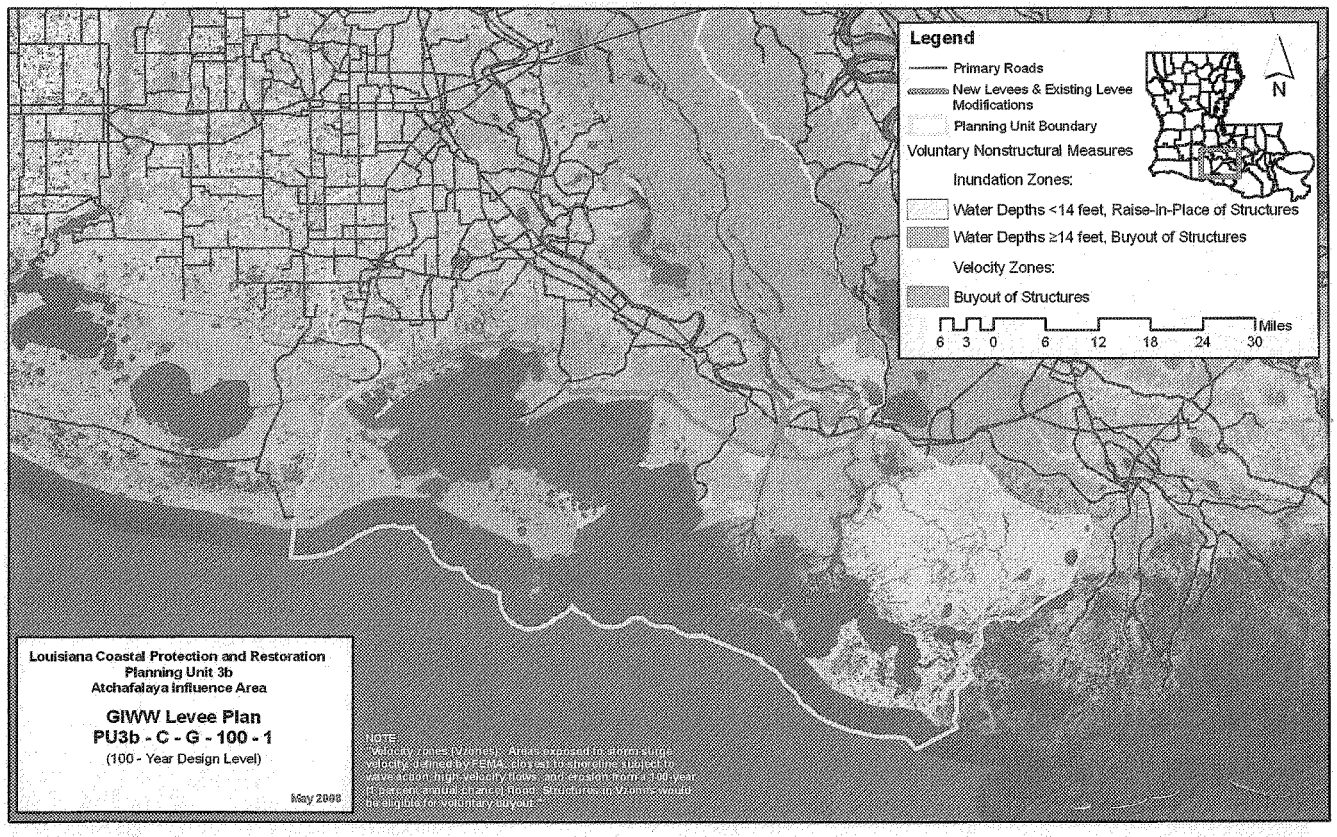
Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	1,032	1,624	78	100	432	23	312	20	5
		Mid		2,429	129	163	744	39	288	19	5
		Low		3,191	191	208	928	48	264	18	5
2	High RSLR High Employment Dispersed Population	High	1,035	1,697	84	36	461	25	312	20	5
		Mid		2,515	136	48	766	41	288	18	5
		Low		3,288	201	61	942	49	264	18	4
3	Low RSLR Business-as-Usual Compact Population	High	1,033	1,526	78	100	415	22	312	20	5
		Mid		2,322	128	162	713	39	288	19	5
		Low		3,066	189	209	887	47	264	18	5
4	High RSLR Business-as-Usual Compact Population	High	1,036	1,597	83	113	444	25	312	20	5
		Mid		2,404	135	174	736	41	288	18	5
		Low		3,162	198	216	904	48	264	18	4

Other Results			Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Construction Time (years)		10	After 50 yrs (% of baseline)	105	104	105	104
Direct Wetland Impacts (acres)		2,300	After 100 yrs (% of baseline)	105	100	105	100
Indirect Impacts (unitless)		-8	Present Value of Life Cycle Costs ($ Millions)				
Spatial Integrity (unitless)		0.44	Coastal Component	4,756	4,796	4,756	4,796
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)	Nonstructural Component	244	244	255	255
	1 / 2	7,132	7,155	Structural Component	15,214	15,238	15,214	15,238
	3 / 4	7,136	7,159	Total Project	20,214	20,278	20,225	20,290

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 3b
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	Comprehensive Plan
10-year	1,024	68	1,523	83	1,013	68	1,543	84	
100-year	4,254	147	5,717	204	4,148	146	5,447	200	GIWW Alt
400-year	8,571	426	9,628	478	7,772	435	8,782	496	
1,000-year	11,203	2,733	11,827	2,754	10,886	2,815	11,680	2,839	100-year Design
2,000-year	12,281	6,240	12,591	6,286	12,370	6,192	12,769	6,211	

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels

1977


Legend
Primary Roads
New Levees & Existing Levee Modifications
Planning Unit Boundary
Voluntary Nonstructural Measures
Inundation Zones:
Water Depths <14 feet, Raise-In-Place of Structures
Water Depths ≥14 feet, Buyout of Structures
Velocity Zones:
Buyout of Structures
6 3 0 6 12 18 24 30 Miles
N
Louisiana Coastal Protection and Restoration
Planning Unit 3b
Atchafalaya Influence Area
GIWW Levee Plan
PU3b - C - G - 100 - 1
(100 - Year Design Level)
May 2008
NOTE:
"Velocity Zones (V Zones): Areas exposed to storm surge velocity, defined by FEMA, closest to shoreline subject to wave action, high velocity flows, and erosion from a 100-year (1 percent annual chance) flood. Structures in V Zones would be eligible for voluntary buyout."

1978

Planning Unit:	3b	Alt. No.:	PU3b-C-F-100-1	Category:	Comprehensive (Coastal+Structural+Nonstructural)
Alternative Description:	Comprehensive plan--Same coastal and structural measures as Alternative PU3b-F-100-1 but with complementary nonstructural measures to reduce residual risk.				
Coastal Component:	R1		Nonstructural Component:		100-yr complementary measures
Structural Component:	Same as Alternative PU3b-F-100-1				

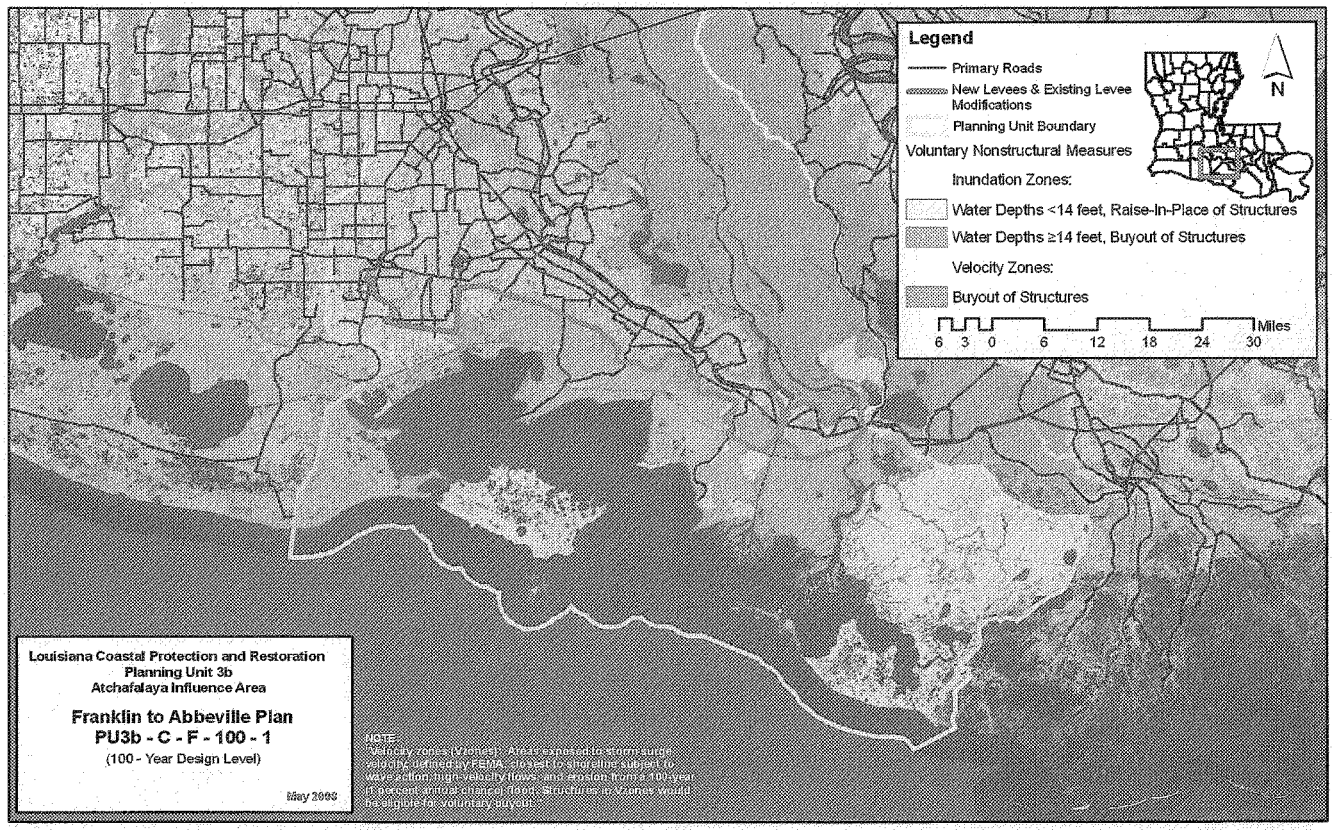
Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	972	1,904	80	101	432	23	202	16	3
		Mid		2,825	137	171	773	42	178	15	3
		Low		3,839	229	238	1,046	56	154	14	1
2	High RSLR High Employment Dispersed Population	High	976	2,002	87	38	465	26	202	16	3
		Mid		2,934	148	60	808	45	178	15	2
		Low		3,987	242	92	1,060	57	154	14	0
3	Low RSLR Business-as-Usual Compact Population	High	973	1,775	80	100	414	23	202	16	3
		Mid		2,672	135	170	739	41	178	15	3
		Low		3,666	223	234	970	52	154	14	1
4	High RSLR Business-as-Usual Compact Population	High	977	1,866	87	115	447	25	202	16	3
		Mid		2,779	145	182	763	43	178	15	2
		Low		3,801	233	243	991	54	154	14	0

Other Results			Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Construction Time (years)		10	After 50 yrs (% of baseline)	105	104	105	104
Direct Wetland Impacts (acres)		2,500	After 100 yrs (% of baseline)	105	100	105	100
Indirect Impacts (unitless)		2	Present Value of Life Cycle Costs ($ Millions)				
Spatial Integrity (unitless)		0.44	Coastal Component	4,756	4,796	4,756	4,796
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)	Nonstructural Component	365	365	379	379
	1 / 2	6,749	6,776	Structural Component	13,918	13,955	13,918	13,955
	3 / 4	6,754	6,781	Total Project	19,039	19,116	19,053	19,130

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 3b
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		Comprehensive Plan
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	Franklin to Abbeville Alt
10-year	1,024	83	1,523	102	1,013	82	1,543	102	100-year Design
100-year	4,254	418	5,717	631	4,148	351	5,447	508	
400-year	8,571	5,300	9,628	5,482	7,772	4,923	8,782	5,092	
1,000-year	11,203	10,720	11,827	10,826	10,886	10,477	11,680	10,643	
2,000-year	12,281	11,245	12,591	11,328	12,370	11,154	12,769	11,236	

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels

1979


Legend
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Water Depths ≥14 feet, Buyout of Structures
Velocity Zones:
Buyout of Structures
N
6 3 0 6 12 18 24 30 Miles
Louisiana Coastal Protection and Restoration
Planning Unit 3b
Atchafalaya Influence Area
Franklin to Abbeville Plan
PU3b - C - F - 100 - 1
(100 - Year Design Level)
May 2003
NOTE:
"Velocity zones (V zones): Areas exposed to storm surge, velocity defined by FEMA, closest to shoreline subject to wave action, high velocity flows, and erosion from a 100-year (1 percent annual chance) flood. Structures in V zones would be eligible for voluntary buyout."

1980

Planning Unit:	3b	Alt. No.:	PU3b-C-F-400-1	Category:	Comprehensive (Coastal+Structural+Nonstructural)
Alternative Description:	Comprehensive plan--Same coastal and structural measures as Alternative PU3b-F-400-1 but with complementary nonstructural measures to reduce residual risk.				
Coastal Component:	R1			Nonstructural Component:	400-yr complementary measures
Structural Component:	Same as Alternative PU3b-F-400-1				

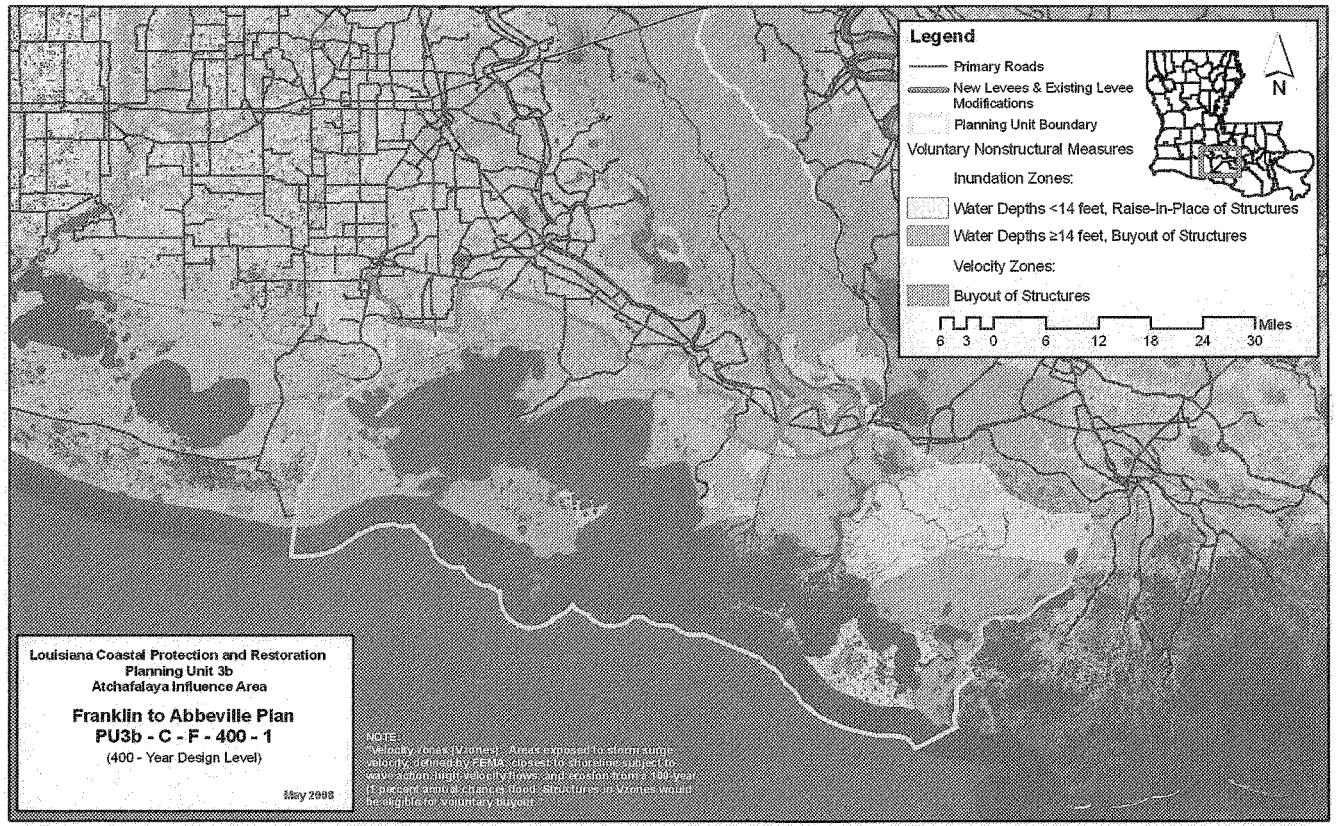
Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	1,455	2,092	85	115	482	26	202	19	5
		Mid		3,014	141	181	821	44	178	19	5
		Low		3,801	209	229	1,017	54	154	18	5
2	High RSLR High Employment Dispersed Population	High	1,467	2,207	93	41	511	29	202	19	5
		Mid		3,144	152	58	862	48	178	19	5
		Low		3,970	222	67	1,036	55	154	18	4
3	Low RSLR Business-as-Usual Compact Population	High	1,463	1,953	84	114	464	26	202	19	5
		Mid		2,857	139	180	785	43	178	19	5
		Low		3,624	204	226	960	51	154	18	5
4	High RSLR Business-as-Usual Compact Population	High	1,475	2,061	92	126	490	28	202	19	5
		Mid		2,983	149	195	816	46	178	19	5
		Low		3,781	215	238	985	53	154	18	4

Other Results			Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Construction Time (years)		12	After 50 yrs (% of baseline)	105	104	105	104
Direct Wetland Impacts (acres)		3,900	After 100 yrs (% of baseline)	105	100	105	100
Indirect Impacts (unitless)		2	Present Value of Life Cycle Costs ($ Millions)				
Spatial Integrity (unitless)		0.44	Coastal Component	4,756	4,796	4,756	4,796
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)	Nonstructural Component	293	293	452	452
	1 / 2	10,061	Structural Component	23,445	23,639	23,445	23,639
	3 / 4	10,117	Total Project	28,494	28,729	28,652	28,888

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 3b
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		Comprehensive Plan
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	Franklin to Abbeville Alt
10-year	1,024	70	1,523	88	1,013	70	1,543	88	400-year Design
100-year	4,254	244	5,717	376	4,148	185	5,447	277	
400-year	8,571	763	9,628	1,051	7,772	540	8,782	800	
1,000-year	11,203	1,369	11,827	1,520	10,886	1,155	11,680	1,365	
2,000-year	12,281	1,921	12,591	2,017	12,370	1,790	12,769	1,884	

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels

1981


Legend
Primary Roads
New Levees & Existing Levee Modifications
Planning Unit Boundary
Voluntary Nonstructural Measures
Inundation Zones:
Water Depths <14 feet, Raise-In-Place of Structures
Water Depths ≥14 feet, Buyout of Structures
Velocity Zones:
Buyout of Structures
N
6 3 0 6 12 18 24 30 Miles
Louisiana Coastal Protection and Restoration
Planning Unit 3b
Atchafalaya Influence Area
Franklin to Abbeville Plan
PU3b - C - F - 400 - 1
(400 - Year Design Level)
May 2008
NOTE:
"Velocity Zones (Vzones): Areas exposed to storm surge velocity, defined by FEMA, closest to shoreline subject to wave action, high velocity flows, and erosion from a 100-year (1 percent annual chance) flood. Structures in Vzones would be eligible for voluntary buyout."

1982

Planning Unit:	3b	Alt. No.:	PU3b-C-F-1000-1	Category:	Comprehensive (Coastal+Structural+Nonstructural)
Alternative Description:	Comprehensive plan--Same coastal and structural measures as Alternative PU3b-F-1000-1 but with complementary nonstructural measures to reduce residual risk.				
Coastal Component:	R1			Nonstructural Component:	1000-yr complementary measures
Structural Component:	Same as Alternative PU3b-F-1000-1				

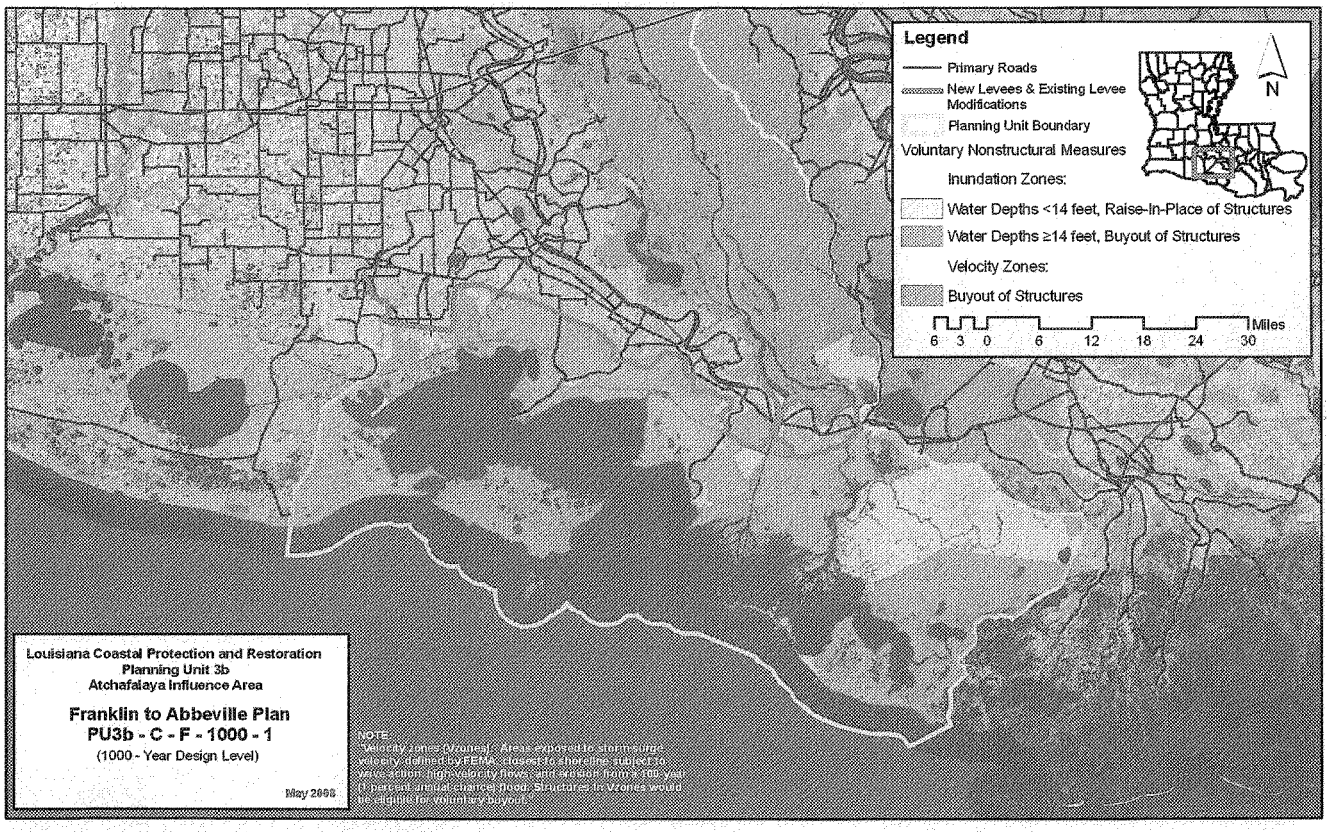
Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	1,853	2,269	91	128	530	29	202	19	5
		Mid		3,280	152	202	900	49	178	19	5
		Low		4,128	224	251	1,104	58	154	18	5
2	High RSLR High Employment Dispersed Population	High	1,856	2,403	100	50	566	32	202	19	5
		Mid		3,431	164	65	937	52	178	19	5
		Low		4,320	239	78	1,137	61	154	18	4
3	Low RSLR Business-as-Usual Compact Population	High	1,855	2,119	91	129	512	29	202	19	5
		Mid		3,112	151	202	866	48	178	19	5
		Low		3,939	220	252	1,057	57	154	18	5
4	High RSLR Business-as-Usual Compact Population	High	1,857	2,246	99	144	545	32	202	19	5
		Mid		3,258	162	219	903	51	178	19	5
		Low		4,119	233	267	1,088	60	154	18	4

Other Results			Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Construction Time (years)		14	After 50 yrs (% of baseline)	105	104	105	104
Direct Wetland Impacts (acres)		5,200	After 100 yrs (% of baseline)	105	100	105	100
Indirect Impacts (unitless)		2	Present Value of Life Cycle Costs ($ Millions)				
Spatial Integrity (unitless)		0.44	Coastal Component	4,756	4,796	4,756	4,796
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)	Nonstructural Component	459	459	492	492
	1 / 2	12,779	12,798	Structural Component	31,074	31,087	31,074	31,087
	3 / 4	12,790	12,809	Total Project	36,288	36,343	36,321	36,375

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 3b
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		Comprehensive Plan
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	Franklin to Abbeville Alt
10-year	1,024	65	1,523	81	1,013	65	1,543	82	1000-year Design
100-year	4,254	153	5,717	226	4,148	144	5,447	196	
400-year	8,571	556	9,628	811	7,772	402	8,782	616	
1,000-year	11,203	1,125	11,827	1,365	10,886	956	11,680	1,228	
2,000-year	12,281	1,507	12,591	1,636	12,370	1,368	12,769	1,491	

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels.

1983


Legend
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Water Depths ≥14 feet, Buyout of Structures
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Buyout of Structures
N
6 3 0 6 12 18 24 30 Miles
Louisiana Coastal Protection and Restoration
Planning Unit 3b
Atchafalaya Influence Area
Franklin to Abbeville Plan
PU3b - C - F - 1000 - 1
(1000 - Year Design Level)
May 2008
NOTE:
"Velocity zones (Vzones): Areas exposed to storm surge velocity defined by FEMA. Closest to shoreline subject to wave action, high-velocity flows, and erosion from a 100 year (1 percent annual chance) flood. Structures in Vzones would be eligible for voluntary buyout."

1984

Planning Unit:	3b	Alt. No.:	PU3b-C-RL-100-1	Category:	Comprehensive (Coastal+Structural+Nonstructural)
Alternative Description:	Comprehensive plan--Same coastal and structural measures as Alternative PU3b-RL-100-1 but with complementary nonstructural measures to reduce residual risk.				
Coastal Component:	R1		Nonstructural Component:		100-yr complementary measures
Structural Component:	Same as Alternative PU3b-RL-100-1				

Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	878	2,711	91	126	472	26	171	15	3
		Mid		3,807	154	204	841	47	147	12	3
		Low		4,988	244	267	1,085	60	123	11	0
2	High RSLR High Employment Dispersed Population	High	882	2,882	103	73	535	32	171	13	3
		Mid		4,026	174	100	889	52	147	12	1
		Low		5,280	269	124	1,110	62	123	8	0
3	Low RSLR Business-as-Usual Compact Population	High	880	2,487	90	127	455	26	171	15	3
		Mid		3,563	151	205	802	46	147	12	3
		Low		4,704	236	266	1,014	57	123	11	0
4	High RSLR Business-as-Usual Compact Population	High	884	2,657	101	147	504	30	171	13	3
		Mid		3,767	168	224	841	49	147	12	1
		Low		4,981	257	278	1,044	59	123	8	0

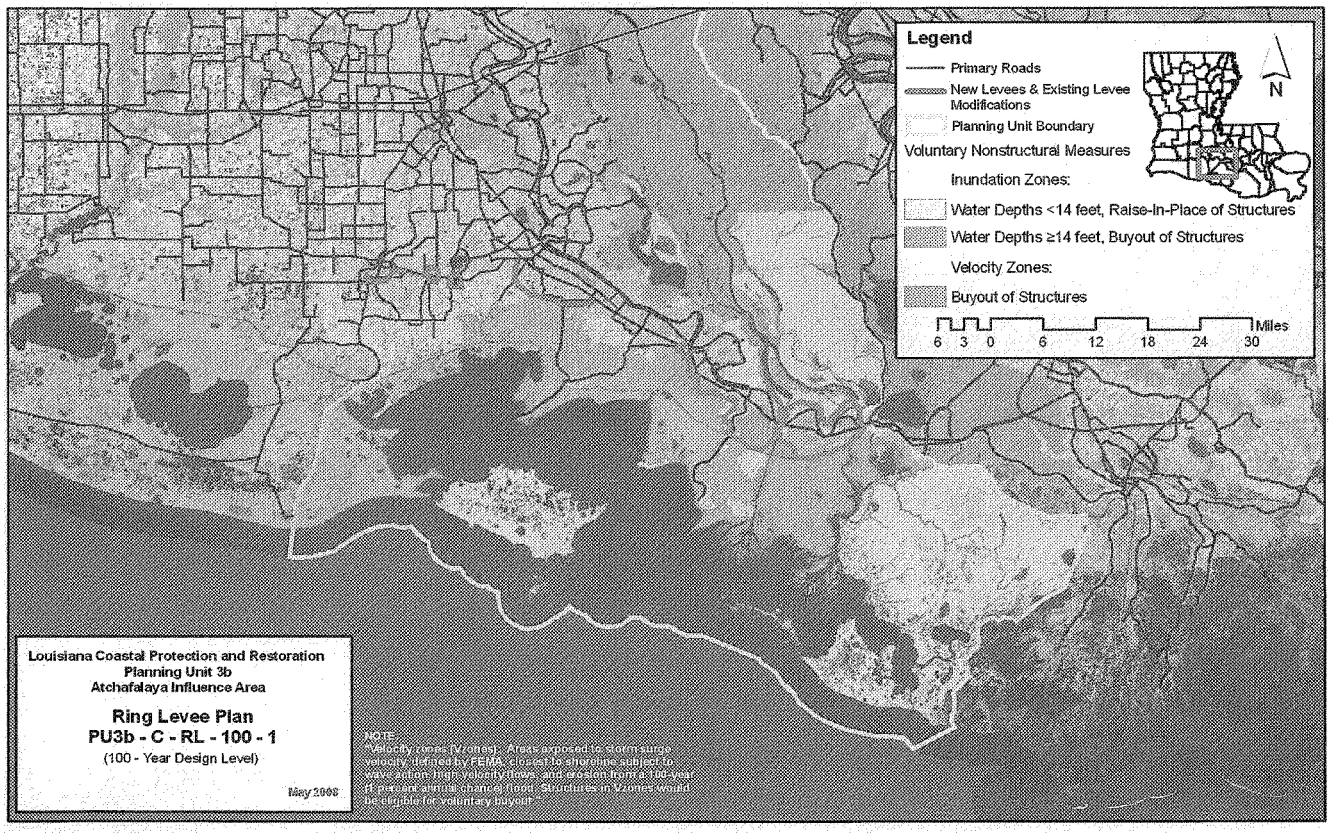
Other Results				Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Construction Time (years)			10	After 50 yrs (% of baseline)	105	104	105	104
Direct Wetland Impacts (acres)			900	After 100 yrs (% of baseline)	105	100	105	100
Indirect Impacts (unitless)			2	Present Value of Life Cycle Costs ($ Millions)				
Spatial Integrity (unitless)			0.44	Coastal Component	4,756	4,796	4,756	4,796
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)		Nonstructural Component	862	862	907	907
	1 / 2	6,192	6,218	Structural Component	11,579	11,612	11,579	11,612
	3 / 4	6,208	6,233	Total Project	17,197	17,271	17,242	17,315

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)								
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4	
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj
10-year	1,024	107	1,523	128	1,013	105	1,543	125
100-year	4,254	1,038	5,717	1,859	4,148	926	5,447	1,585
400-year	8,571	6,486	9,628	7,016	7,772	5,973	8,782	6,399
1,000-year	11,203	9,360	11,827	9,686	10,886	8,745	11,680	9,113
2,000-year	12,281	10,261	12,591	10,468	12,370	9,833	12,769	10,075

Planning Unit 3b
Comprehensive Plan
Ring Levee Alt
100-year Design

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels.

1985


Legend
Primary Roads
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Voluntary Nonstructural Measures
Inundation Zones:
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Water Depths ≥14 feet, Buyout of Structures
Velocity Zones:
Buyout of Structures
N
6 3 0 6 12 18 24 30 Miles
Louisiana Coastal Protection and Restoration
Planning Unit 3b
Atchafalaya Influence Area
Ring Levee Plan
PU3b - C - RL - 100 - 1
(100 - Year Design Level)
May 2008
NOTE:
"Velocity zones (Wrong): Areas exposed to storm surge velocity, defined by FEMA, closest to shoreline subject to wave action, high velocity flows, and erosion from a 100-year (1 percent annual chance) flood. Structures in V zones would be eligible for voluntary buyout."

1986

Planning Unit:	3b	Alt. No.:	PU3b-C-RL-400-1	Category:	Comprehensive (Coastal+Structural+Nonstructural)
Alternative Description:	Comprehensive plan--Same coastal and structural measures as Alternative PU3b-RL-400-1 but with complementary nonstructural measures to reduce residual risk.				
Coastal Component:	R1		Nonstructural Component:		400-yr complementary measures
Structural Component:	Same as Alternative PU3b-RL-400-1				

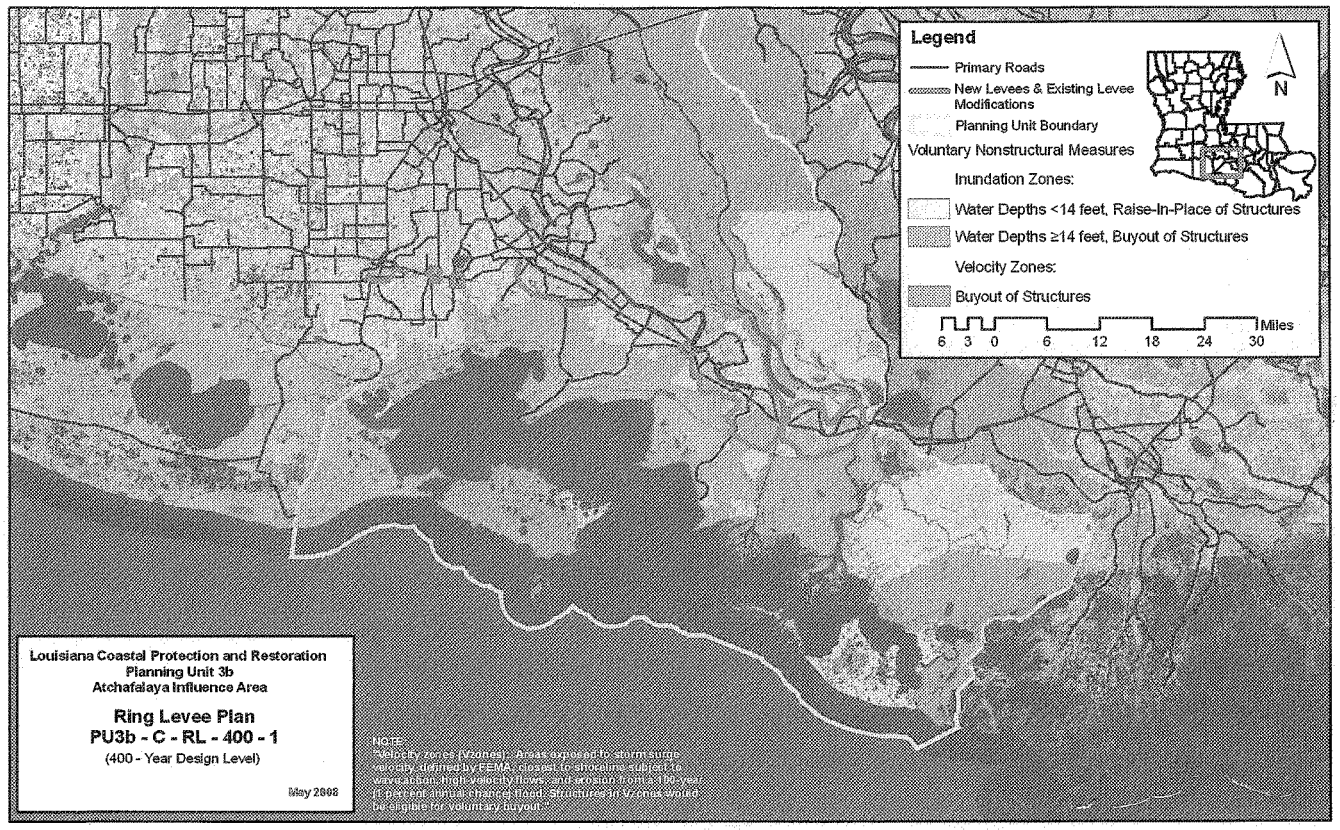
Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	1,213	2,767	88	129	492	27	171	17	3
		Mid		3,864	143	196	832	46	147	16	3
		Low		4,882	213	247	1,037	56	123	15	3
2	High RSLR High Employment Dispersed Population	High	1,216	2,949	97	57	525	31	171	15	3
		Mid		4,095	156	72	869	49	147	15	3
		Low		5,184	229	85	1,058	58	123	13	2
3	Low RSLR Business-as-Usual Compact Population	High	1,253	2,537	87	131	478	27	171	17	3
		Mid		3,613	142	197	801	45	147	16	3
		Low		4,591	208	248	990	54	123	15	3
4	High RSLR Business-as-Usual Compact Population	High	1,256	2,718	96	144	506	30	171	15	3
		Mid		3,829	154	213	836	48	147	15	3
		Low		4,878	223	259	1,016	56	123	13	2

Other Results			Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Construction Time (years)		12	After 50 yrs (% of baseline)	105	104	105	104
Direct Wetland Impacts (acres)		1,700	After 100 yrs (% of baseline)	105	100	105	100
Indirect Impacts (unitless)		2	Present Value of Life Cycle Costs ($ Millions)				
Spatial Integrity (unitless)		0.44	Coastal Component	4,756	4,796	4,756	4,796
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)	Nonstructural Component	1,002	1,002	1,785	1,785
	1 / 2	8,493	8,516	Structural Component	17,996	18,024	17,996	18,024
	3 / 4	8,767	8,791	Total Project	23,754	23,822	24,537	24,605

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 3b
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	Comprehensive Plan
10-year	1,024	95	1,523	113	1,013	92	1,543	110	
100-year	4,254	291	5,717	376	4,148	284	5,447	364	Ring Levee Alt
400-year	8,571	1,827	9,628	3,227	7,772	1,413	8,782	2,466	
1,000-year	11,203	6,161	11,827	6,696	10,886	5,280	11,680	5,812	400-year Design
2,000-year	12,281	8,635	12,591	8,885	12,370	8,156	12,769	8,441	

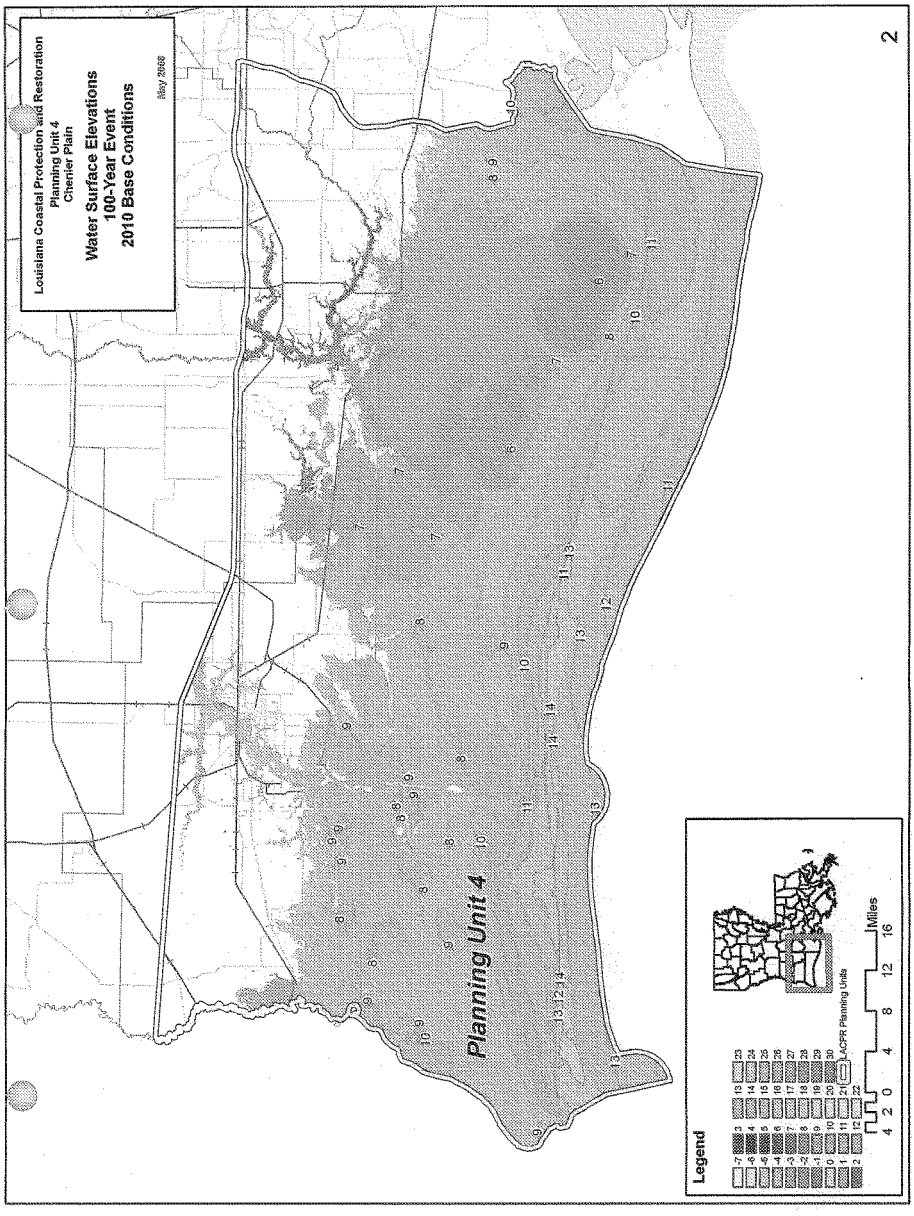
Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels.

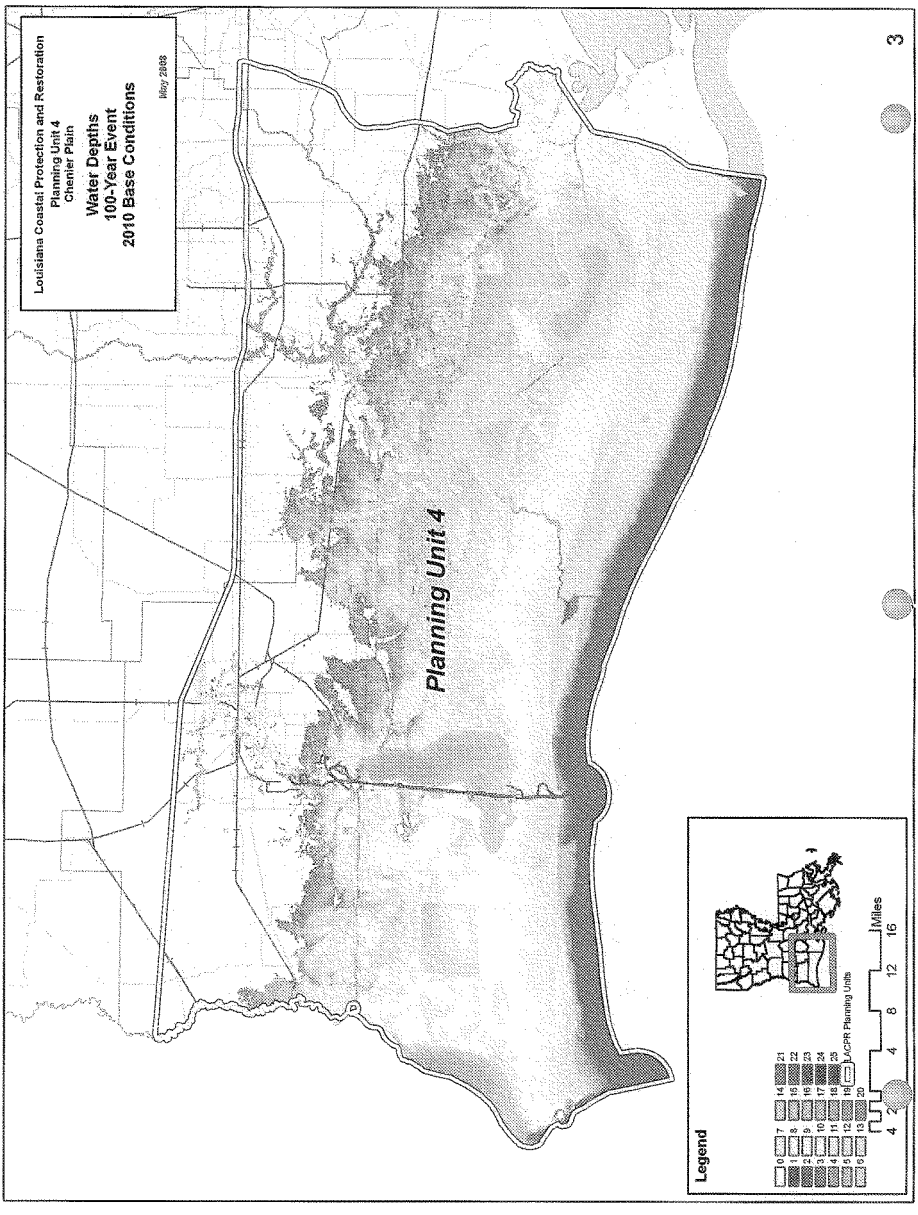
1987

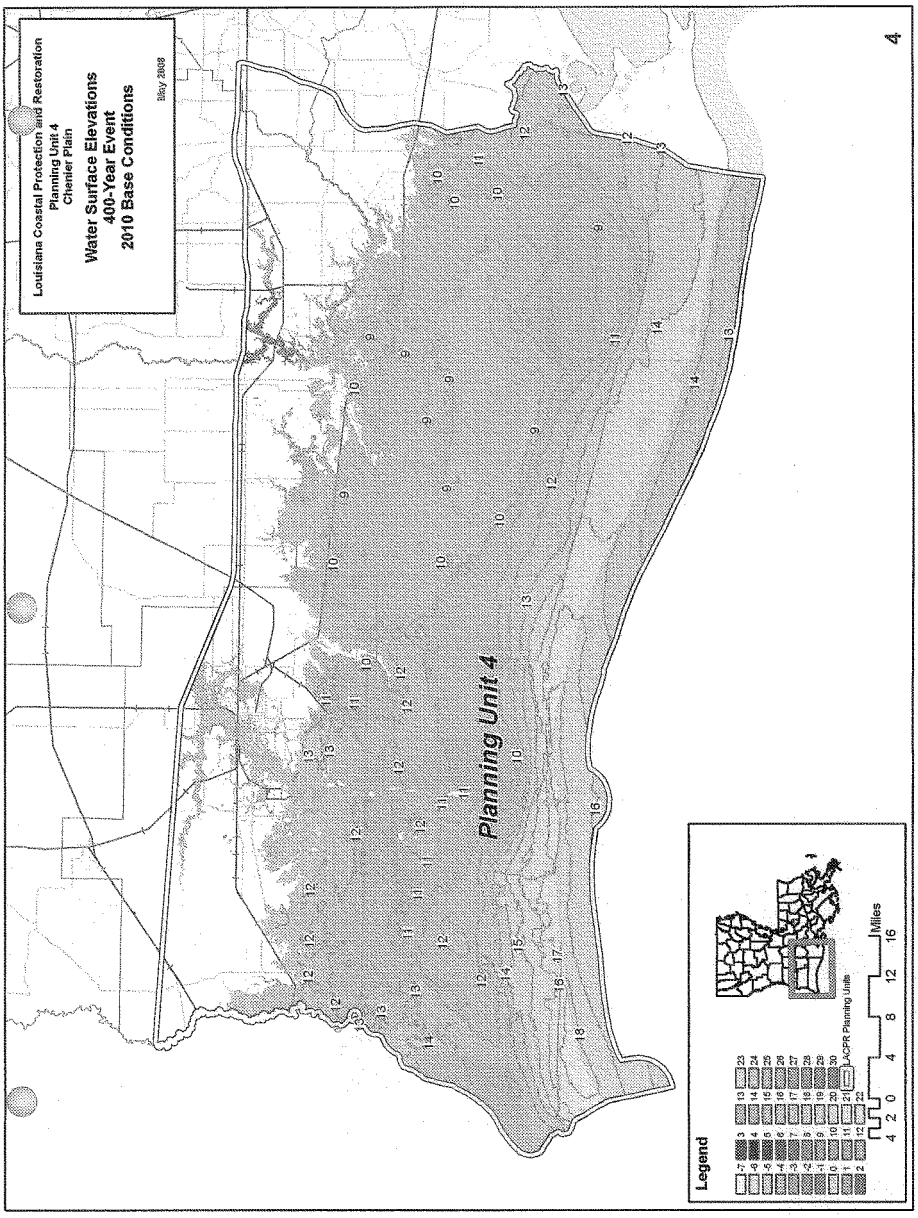

Legend
Primary Roads
New Levees & Existing Levee Modifications
Planning Unit Boundary
Voluntary Nonstructural Measures
Inundation Zones:
Water Depths <14 feet, Raise-In-Place of Structures
Water Depths ≥14 feet, Buyout of Structures
Velocity Zones:
Buyout of Structures
N
6 3 0 6 12 18 24 30 Miles
Louisiana Coastal Protection and Restoration
Planning Unit 3b
Atchafalaya Influence Area
Ring Levee Plan
PU3b - C - RL - 400 - 1
(400 - Year Design Level)
May 2008
NOTE:
"Velocity zones (V zones): Areas exposed to storm surge velocity, defined by FEMA, closest to shoreline subject to wave action, high velocity flows, and erosion from a 100-year (1 percent annual chance) flood. Structures in V zones would be eligible for voluntary buyout."

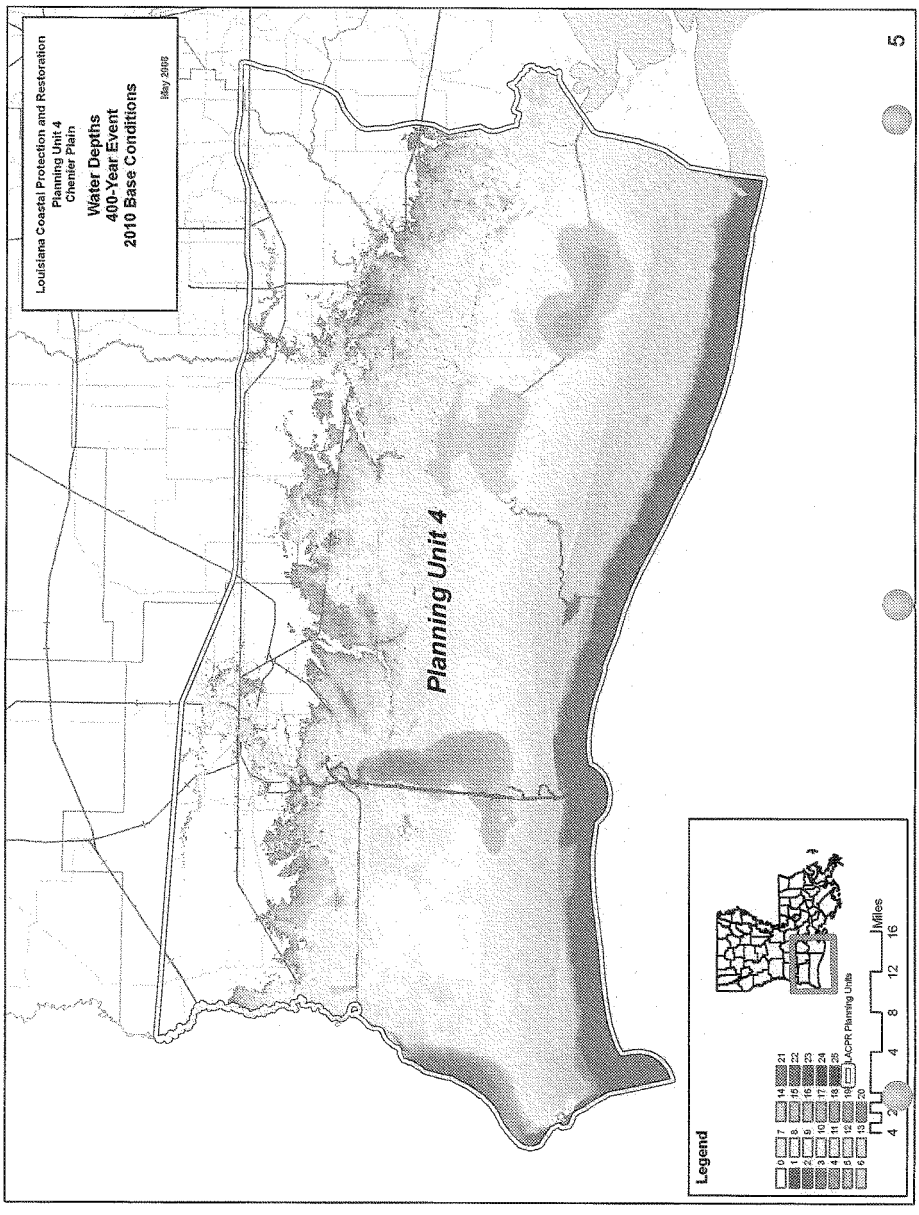
1988

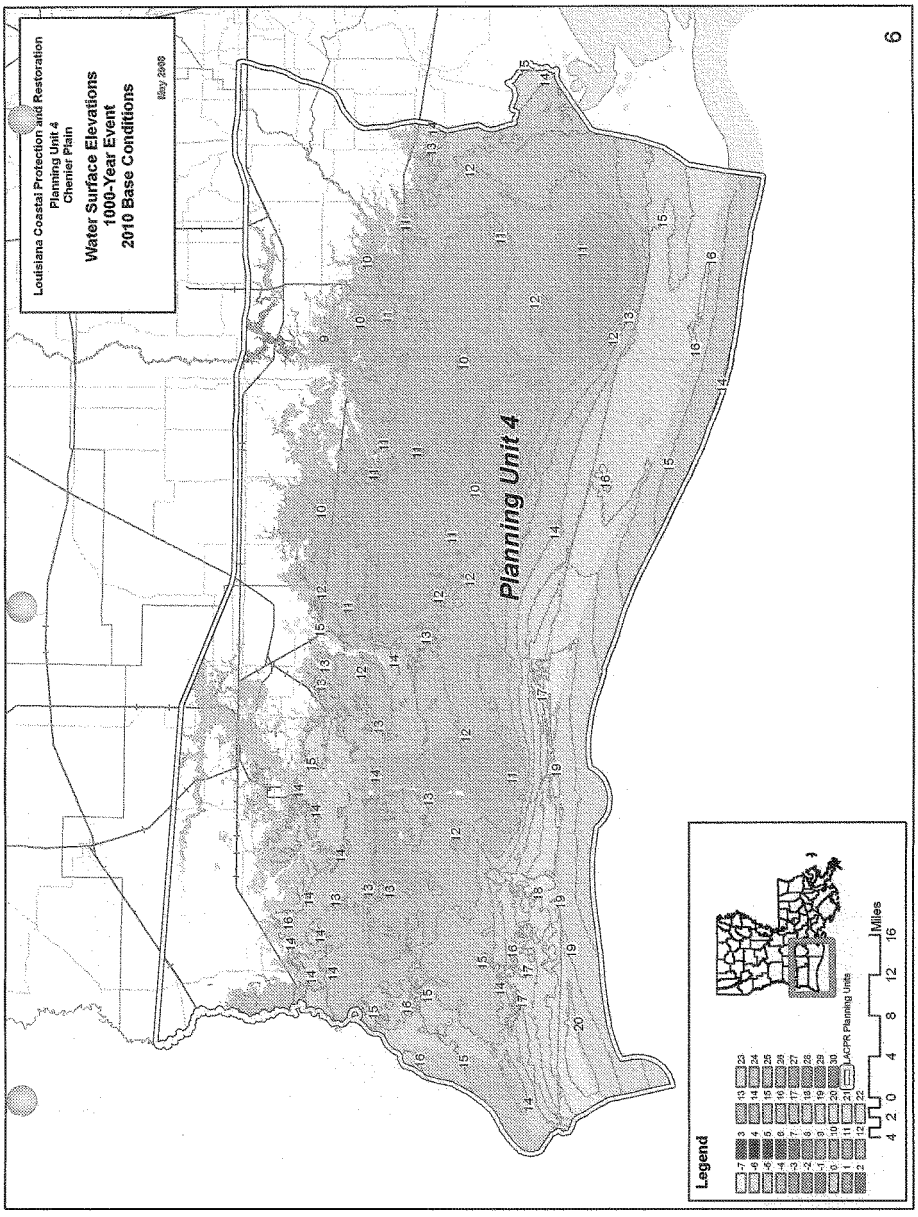
Planning Unit 4

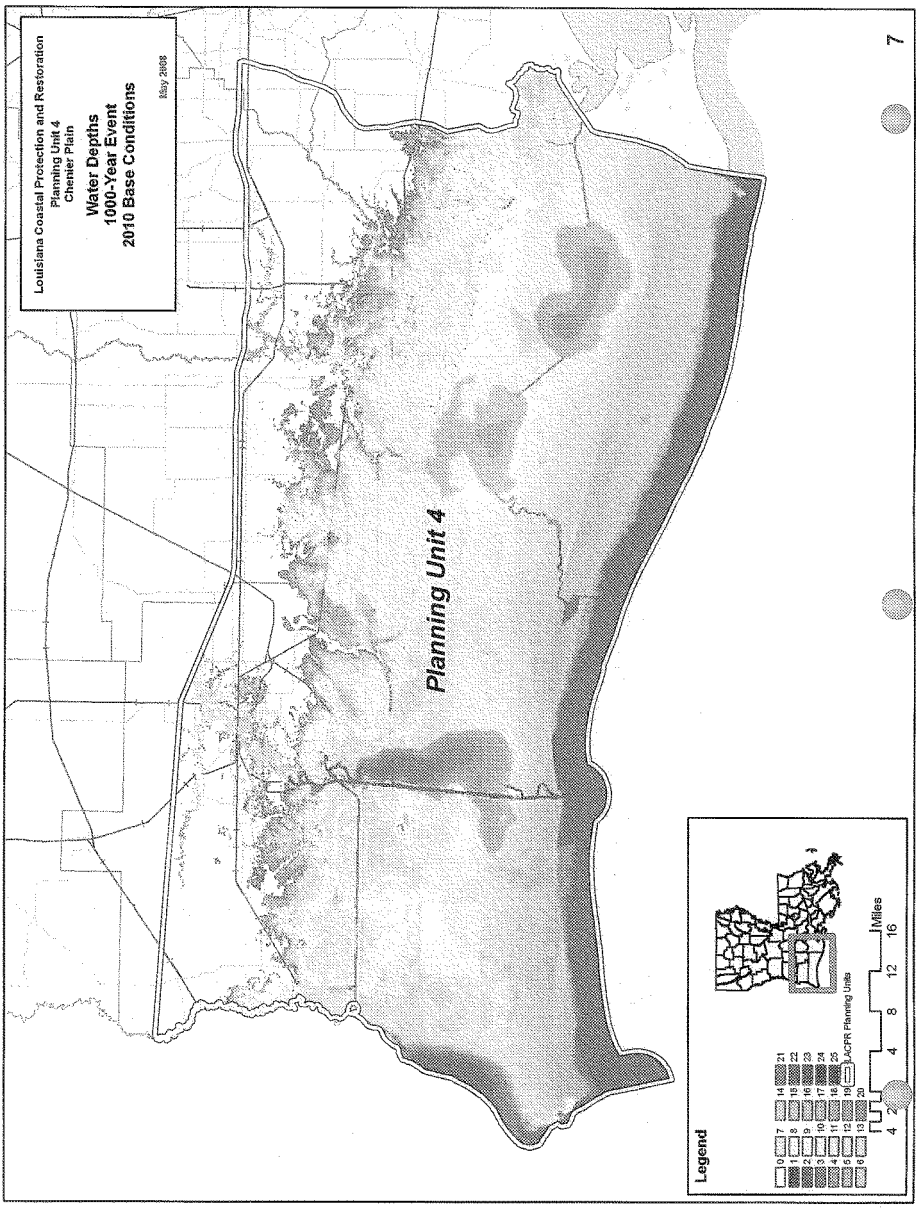

Louisiana Coastal Protection and Restoration
Planning Unit 4
Chenier Plain
Water Surface Elevations
100-Year Event
2010 Base Conditions
May 2008
Planning Unit 4
Legend
LACPR Planning Units
Miles
4 2 0 4 8 12 16
2


Louisiana Coastal Protection and Restoration
Planning Unit 4
Chenier Plain
Water Depths
100-Year Event
2010 Base Conditions
May 2008
Planning Unit 4
Legend
LACPR Planning Units
Miles
4 2 0 4 8 12 16


Louisiana Coastal Protection and Restoration
Planning Unit 4
Chenier Plain
Water Surface Elevations
400-Year Event
2010 Base Conditions
May 2008
Planning Unit 4
Legend
LACPR Planning Units
Miles
4 2 0 4 8 12 16
4


Louisiana Coastal Protection and Restoration
Planning Unit 4
Chenier Plain
Water Depths
400-Year Event
2010 Base Conditions
May 2008
Planning Unit 4
Legend
LACPR Planning Units
Miles
4 2 0 4 8 12 16


Louisiana Coastal Protection and Restoration
Planning Unit 4
Chenier Plain
Water Surface Elevations
1000-Year Event
2010 Base Conditions
May 2008
Planning Unit 4
Legend
LACPR Planning Units
Miles
4 2 0 4 8 12 16
6


Louisiana Coastal Protection and Restoration
Planning Unit 4
Chenier Plain
Water Depths
1000-Year Event
2010 Base Conditions
May 2008
Planning Unit 4
Legend
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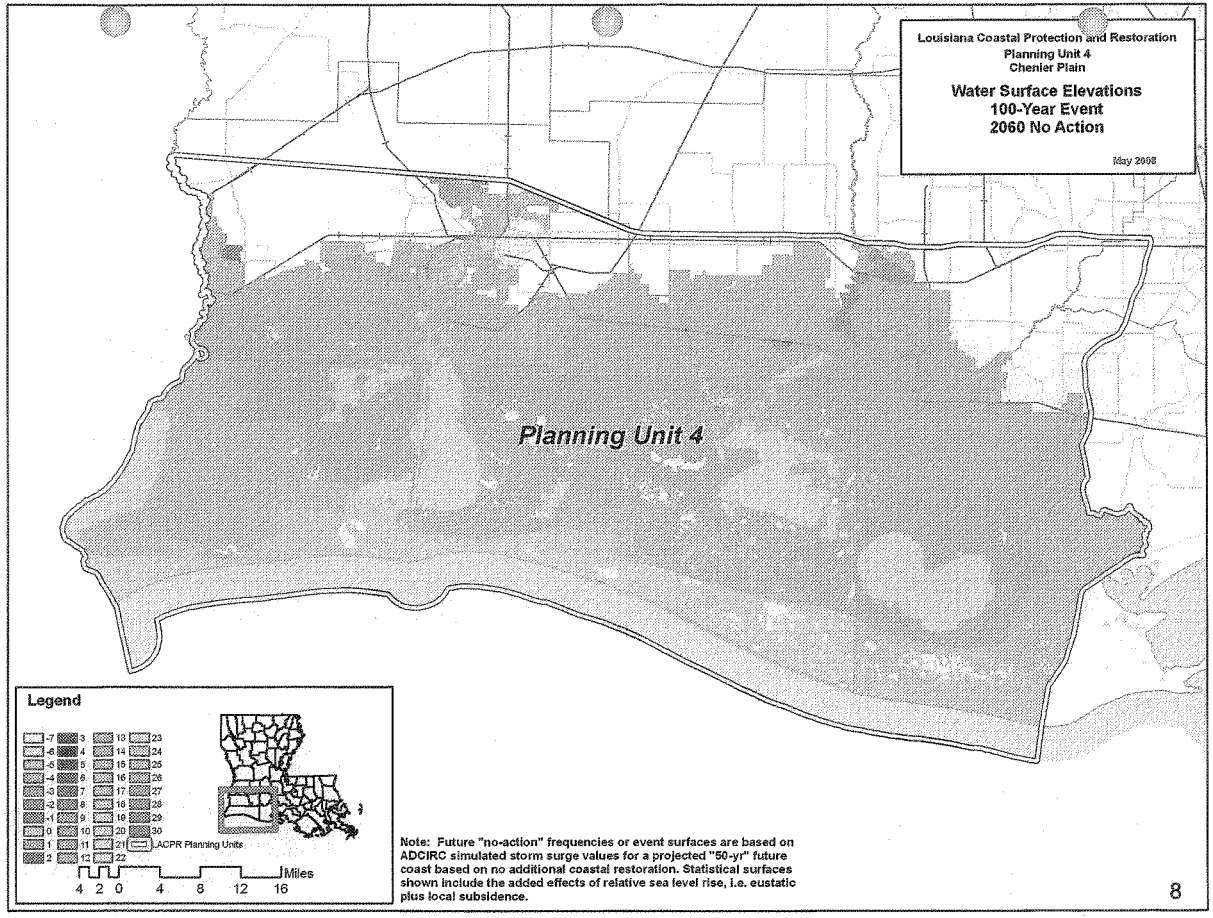
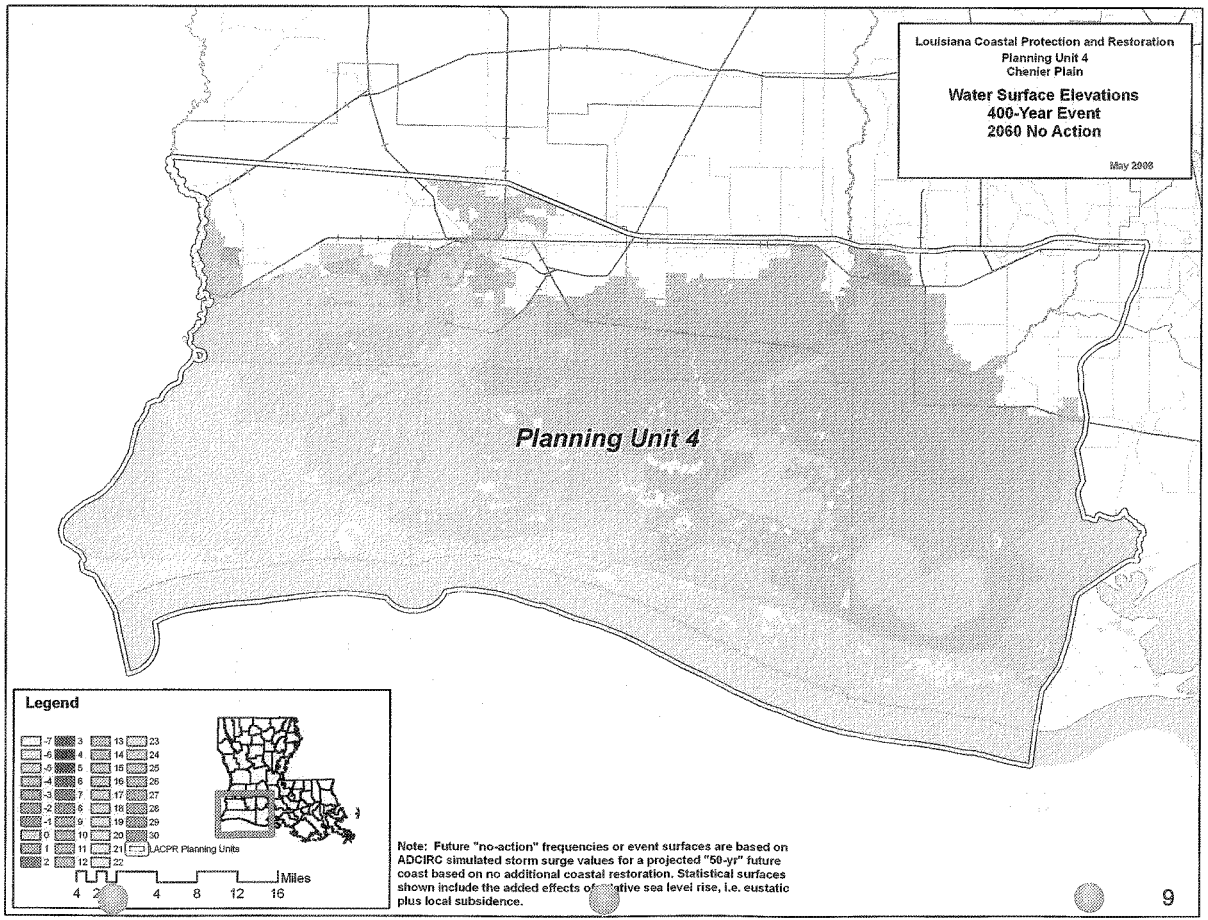
LACPR Planning Units
4 2 4 8 12 16
Miles



Note: Future "no-action" frequencies or event surfaces are based on ADCIRC simulated storm surge values for a projected "50-yr" future coast based on no additional coastal restoration. Statistical surfaces shown include the added effects of relative sea level rise, i.e. eustatic plus local subsidence.

1996


Louisiana Coastal Protection and Restoration
Planning Unit 4
Chenier Plain
Water Surface Elevations
400-Year Event
2060 No Action
May 2008
Planning Unit 4
Legend
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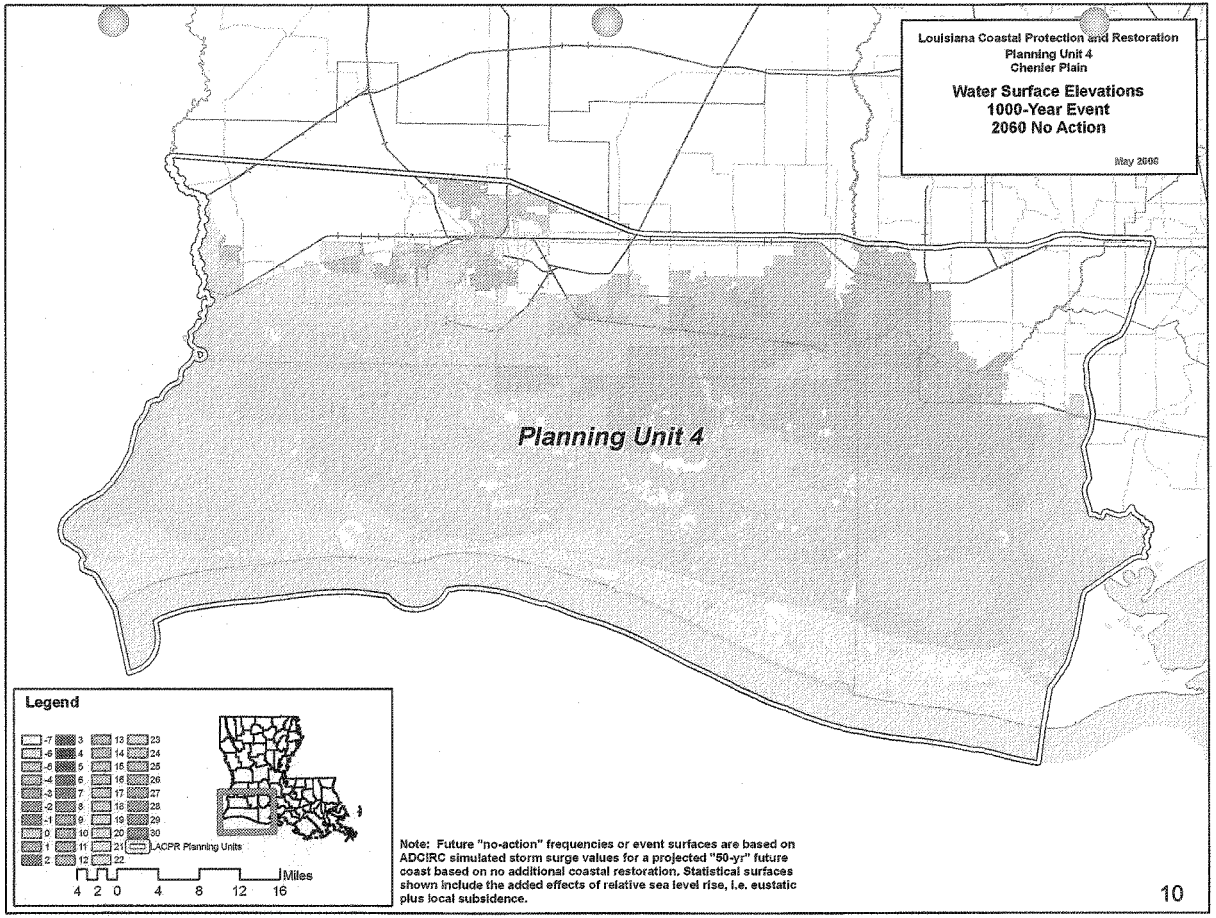
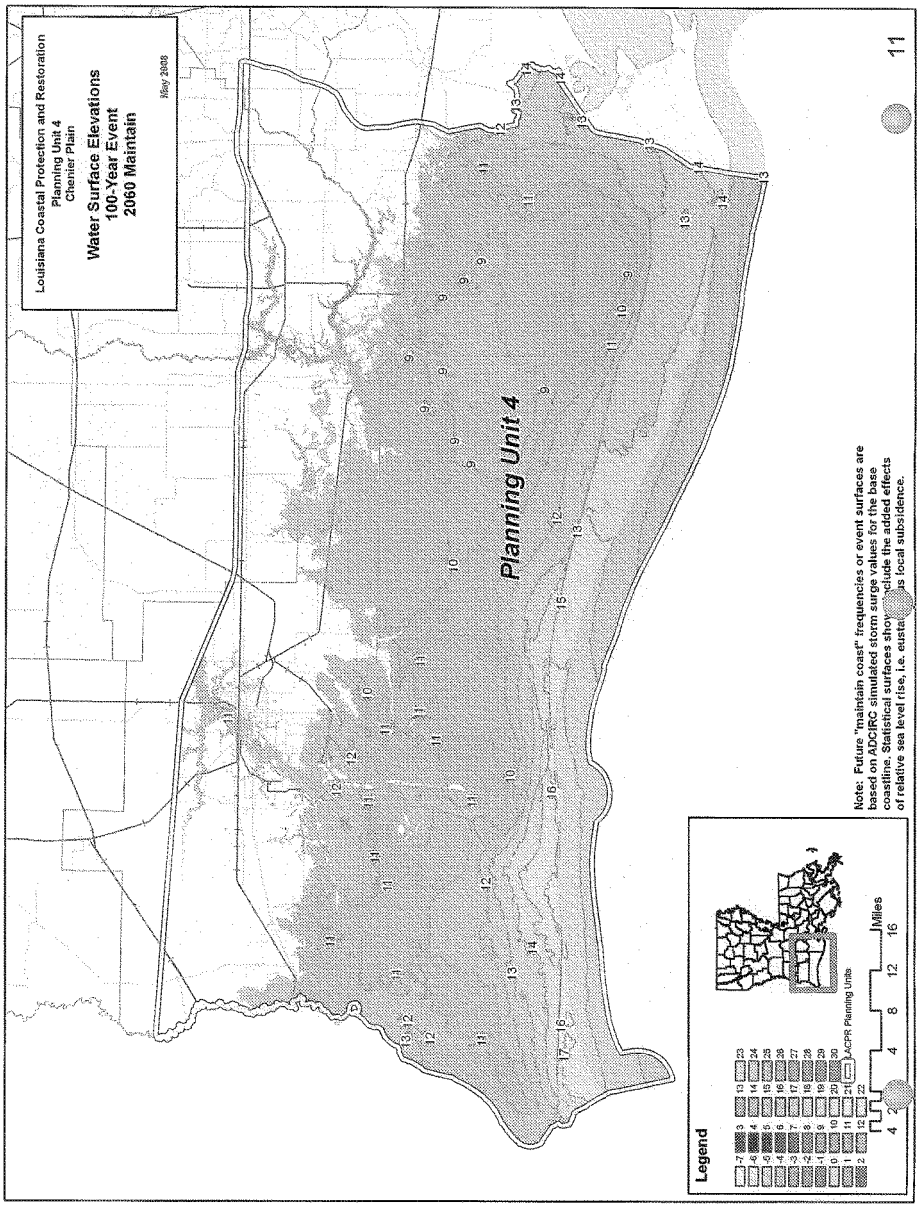
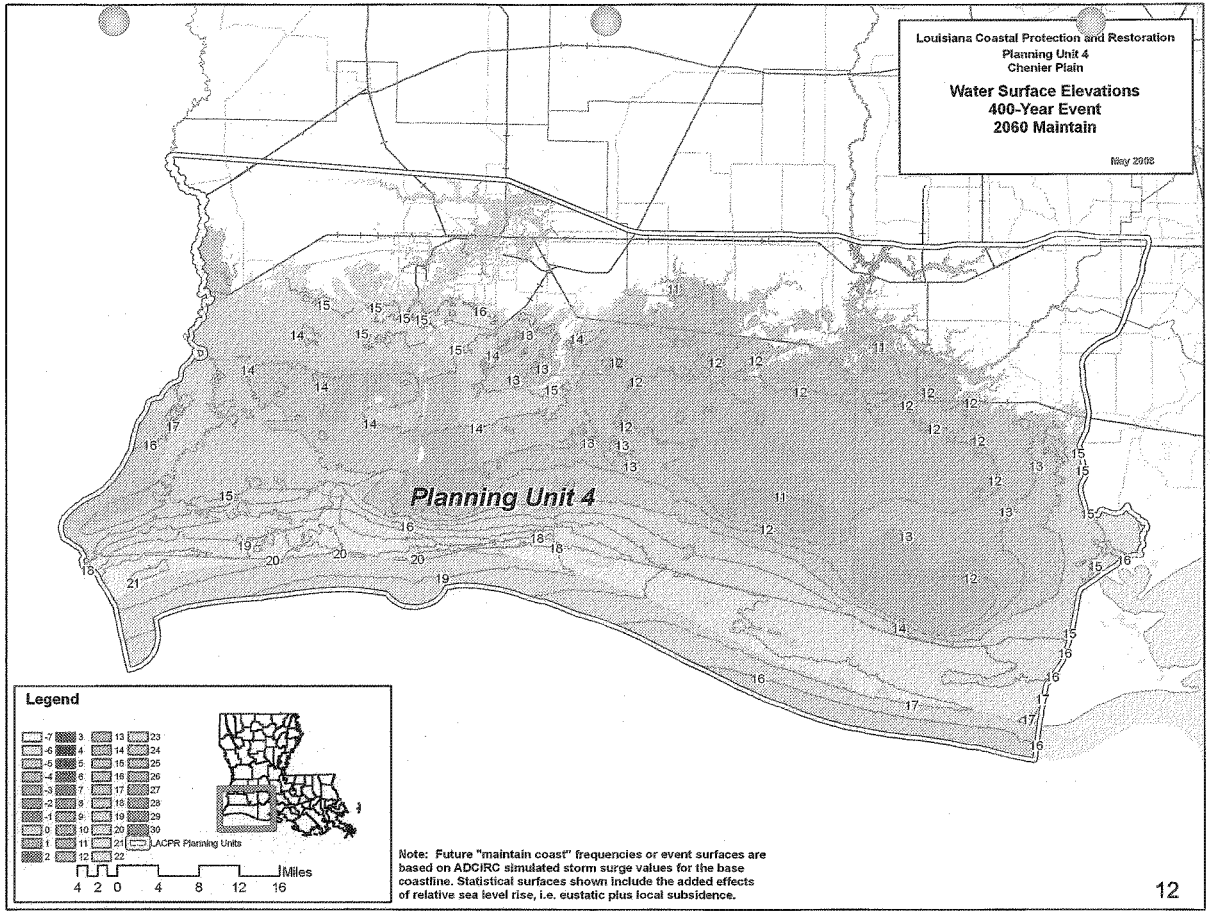
3 4 5 6 7 8 9 10 11 12
13 14 15 16 17 18 19 20 21 22
23 24 25 26 27 28 29 30
LACPR Planning Units
Miles
4 2 4 8 12 16
Note: Future "no-action" frequencies or event surfaces are based on ADCIRC simulated storm surge values for a projected "50-yr" future coast based on no additional coastal restoration. Statistical surfaces shown include the added effects of relative sea level rise, i.e. eustatic plus local subsidence.

1997

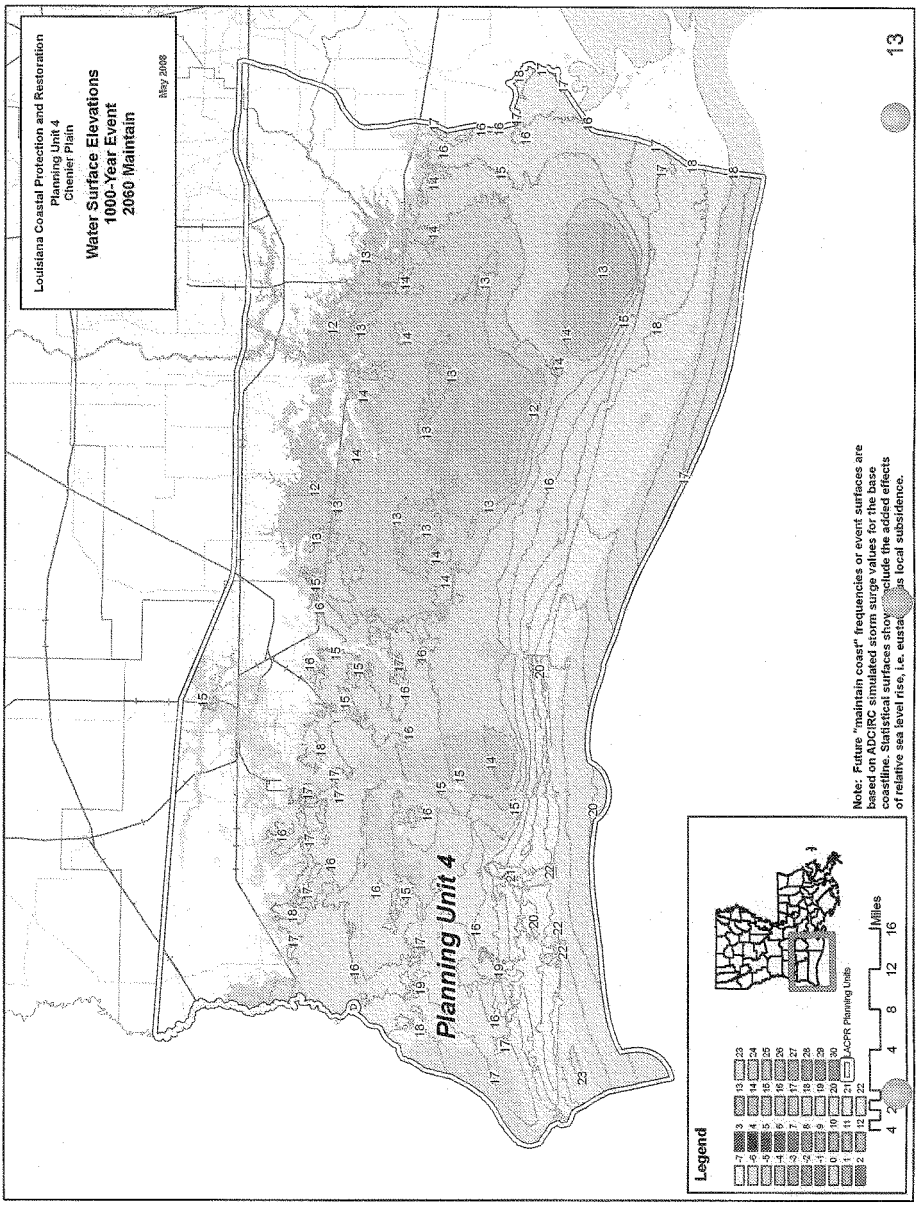

Louisiana Coastal Protection and Restoration
Planning Unit 4
Chenier Plain
Water Surface Elevations
1000-Year Event
2060 No Action
May 2006
Planning Unit 4
Legend
LACPR Planning Units
Miles
4 2 0 4 8 12 16
Note: Future "no-action" frequencies or event surfaces are based on ADCIRC simulated storm surge values for a projected "50-yr" future coast based on no additional coastal restoration. Statistical surfaces shown include the added effects of relative sea level rise, i.e. eustatic plus local subsidence.
10

1998


Louisiana Coastal Protection and Restoration
Planning Unit 4
Chenier Plain
Water Surface Elevations
100-Year Event
2060 Maintain
May 2048
Planning Unit 4
Legend
LACPR Planning Units
Miles
4 2 4 8 12 16
Note: Future "maintain coast" frequencies or event surfaces are based on ADCIRC simulated storm surge values for the base coastline. Statistical surfaces shown include the added effects of relative sea level rise, i.e. eustatic and local subsidence.
11



Note: Future "maintain coast" frequencies or event surfaces are based on ADCIRC simulated storm surge values for the base coastline. Statistical surfaces shown include the added effects of relative sea level rise, i.e. eustatic plus local subsidence.


Louisiana Coastal Protection and Restoration
Planning Unit 4
Chenier Plain
Water Surface Elevations
1000-Year Event
2060 Maintain
May 2008
Planning Unit 4
Legend
LACPR Planning Units
Miles
4 2 4 8 12 16
Note: Future "maintain coast" frequencies or event surfaces are based on ADCIRC simulated storm surge values for the base coastline. Statistical surfaces shown include the added effects of relative sea level rise, i.e. eustatic and local subsidence.
13

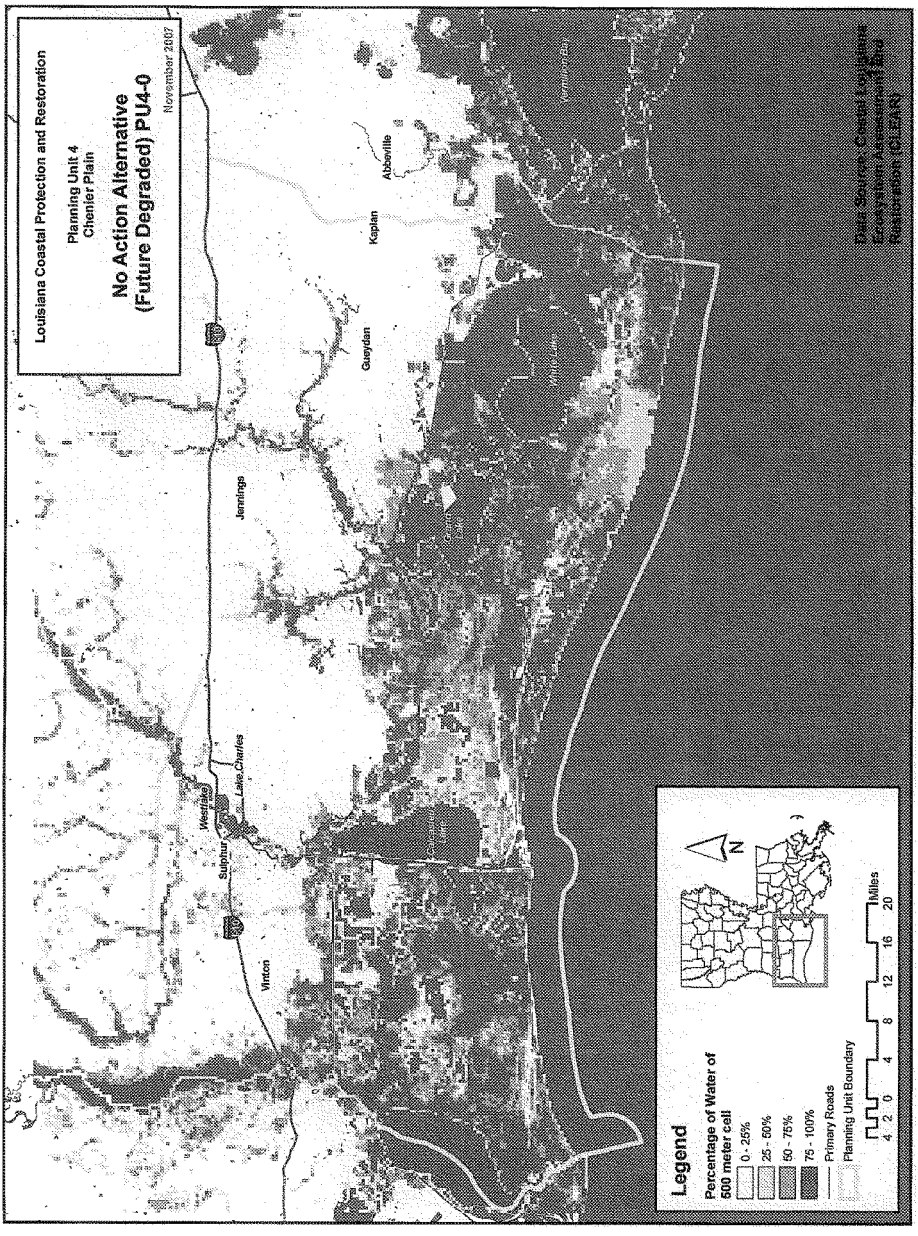
Planning Unit:	4	Alt. No.:	4-0	Category:	No Action
Alternative Description:	No action (without project) alternative.				
Coastal Component:	Degraded coast--increasing risk.		Nonstructural Component:		None
Structural Component:	No new levees or increases in risk reduction level for existing levees.				

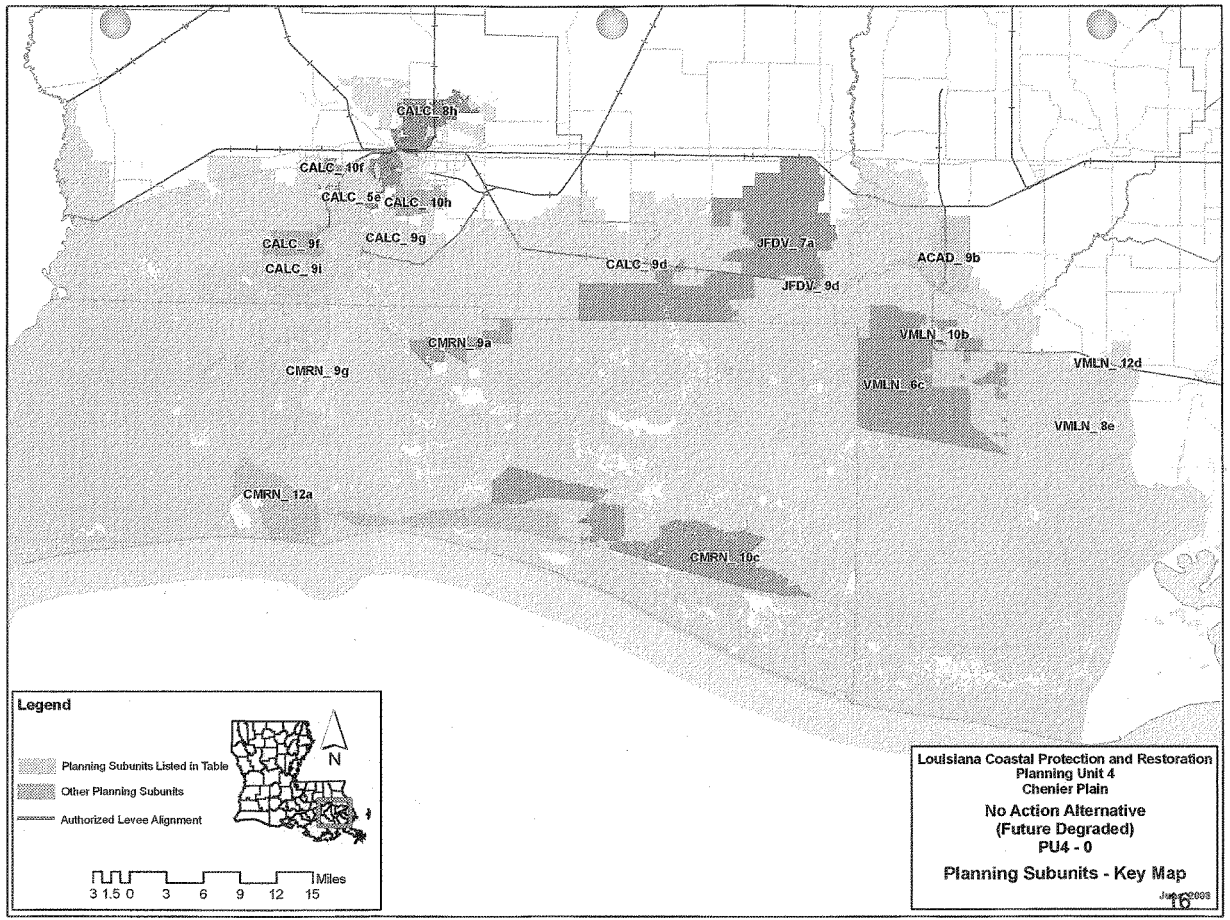
Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	0	2,630	217	255	690	46	37	1	0
		Mid		3,791	283	290	792	52	33	0	0
		Low		4,752	373	365	996	67	29	0	0
2	High RSLR High Employment Dispersed Population	High	0	3,000	238	274	719	49	37	1	0
		Mid		4,046	318	375	926	65	33	0	0
		Low		5,278	417	465	1,080	76	29	0	0
3	Low RSLR Business-as-Usual Compact Population	High	0	2,551	224	272	722	49	37	1	0
		Mid		3,603	296	308	825	55	33	0	0
		Low		4,432	397	377	1,027	69	29	0	0
4	High RSLR Business-as-Usual Compact Population	High	0	2,866	248	305	770	54	37	1	0
		Mid		3,851	339	388	961	69	33	0	0
		Low		4,862	463	462	1,104	78	29	0	0

Other Results			Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Construction Time (years)		0	After 50 yrs (% of baseline)	96	95	96	95
Direct Wetland Impacts (acres)		0	After 100 yrs (% of baseline)	92	87	92	87
Indirect Impacts (unitless)		0	Present Value of Life Cycle Costs ($ Millions)				
Spatial Integrity (unitless)		0.31	Coastal Component	0	0	0	0
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)	Nonstructural Component	0	0	0	0
	1 / 2	0	Structural Component	0	0	0	0
	3 / 4	0	Total Project	0	0	0	0

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 4
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	
10-year	472	N/A	725	N/A	511	N/A	794	N/A	No Action Plan
100-year	3,034	N/A	4,142	N/A	3,315	N/A	5,183	N/A	
400-year	6,592	N/A	7,874	N/A	8,001	N/A	9,283	N/A	
1,000-year	10,316	N/A	11,581	N/A	11,241	N/A	12,313	N/A	
2,000-year	12,755	N/A	13,904	N/A	13,422	N/A	14,373	N/A	

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels.


Louisiana Coastal Protection and Restoration
Planning Unit 4
Chenier Plain
No Action Alternative
(Future Degraded) PU4-0
November 2007
Lake Charles
Jennings
Kaplan
Abbeville
Gueydan
Vinton
Sulphur
Westlake
Legend
Percentage of Water of 500 meter cell
0 - 25%
25 - 50%
50 - 75%
75 - 100%
Primary Roads
Planning Unit Boundary
Miles
4 2 0 4 8 12 16 20
N
Data Source: Coastal Louisiana Ecosystem Assessment and Restoration (CLEAN)


CALC_8h
CALC_10f
CALC_5e
CALC_10h
CALC_9f
CALC_9g
CALC_9i
CALC_9d
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JFDV_9d
ACAD_9b
CMRN_9a
CMRN_9g
VMLN_10b
VMLN_12d
VMLN_6c
VMLN_8e
CMRN_12a
CMRN_10c
Legend
Planning Subunits Listed in Table
Other Planning Subunits
Authorized Levee Alignment
N
3 1.5 0 3 6 9 12 15
Miles
Louisiana Coastal Protection and Restoration
Planning Unit 4
Chenier Plain
No Action Alternative
(Future Degraded)
PU4 - 0
Planning Subunits - Key Map

2004

Alternative: PU4-0

Water Surface Elevations (feet - NAVD88 2004.65)

Planning Sub Unit	2010 (Base) Conditions						2060 (Future) Conditions					
	100-yr Event		400-year Event		1,000-yr Event		100-yr Event		400-year Event		1,000-yr Event	
	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project
ACAD_9b	7.8		9.4		12.2		10.4		12.0		14.8	
CALC_10f	6.0		8.1		9.7		8.6		10.7		12.3	
CALC_10h	5.5		6.1		9.1		8.1		8.7		11.7	
CALC_5e	7.8		8.5		12.1		10.4		11.1		14.7	
CALC_8h	7.8		10.7		12.8		10.4		13.3		15.4	
CALC_9d	7.8		9.7		13.6		10.4		12.3		16.2	
CALC_9f	8.8		13.6		16.0		11.4		16.2		18.6	
CALC_9g	10.9		14.6		17.1		13.5		17.2		19.7	
CALC_9i	8.4		12.8		15.3		11.0		15.4		17.9	
CMRN_10c	11.1		14.8		16.8		13.8		17.1		18.8	
CMRN_12a	13.0		16.9		19.0		15.3		18.9		20.7	
CMRN_9a	9.5		14.1		16.3		12.1		16.7		18.9	
CMRN_9g	9.6		13.1		15.2		12.7		16.4		18.6	
JFDV_7a	7.5		11.9		14.7		10.1		14.5		17.3	
JFDV_9d	6.4		11.1		13.5		9.0		13.7		16.1	
VMLN_10b	7.8		11.2		13.5		10.4		13.8		16.1	
VMLN_12d	7.8		11.1		14.3		10.4		13.7		16.9	
VMLN_6c	7.8		10.7		12.7		10.4		13.3		15.3	
VMLN_8e	8.6		12.1		14.2		11.2		14.7		16.8	

Evaluation Parameters				
	Confidence Level:	90%	Levee Design:	No Friction Waves
	Future Relative Sea Level Rise:	2.6 feet	Levee Overtopping:	No Friction Waves

2005

Planning Un	4	Alt. No.:	-R1	Category:	Coastal Restoration O
Alternative Description:	Sustain coastal landscape through restoration including shoreline protection, marsh creation, etc.				
Coastal Component:	R1		Nonstructural Component:		None
Structural Component:	No new levees or increases in risk reduction level for existing levees.				

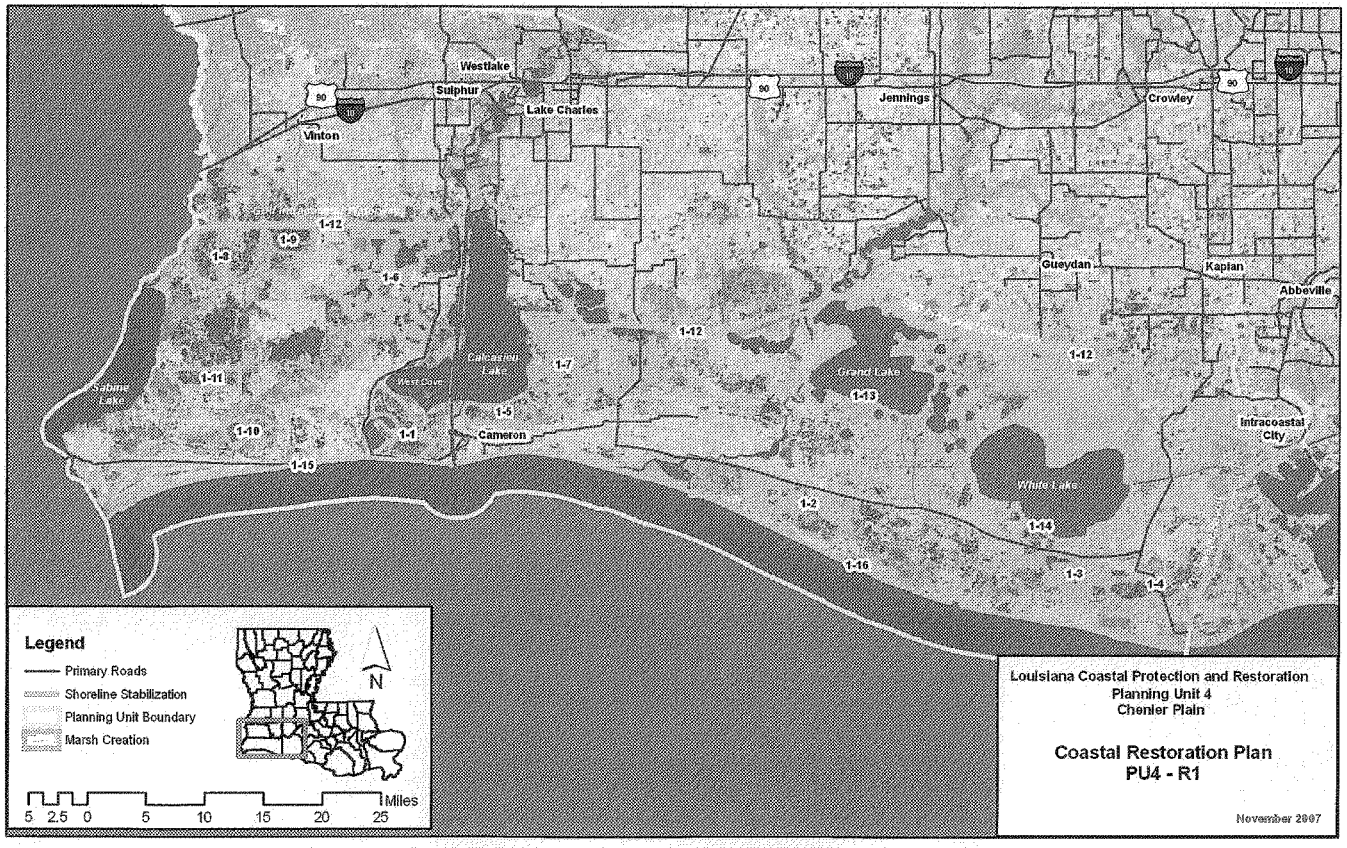
Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	551	2,625	217	258	692	47	107	3	0
		Mid		3,790	283	289	791	52	83	3	0
		Low		4,753	373	365	996	67	58	2	0
2	High RSLR High Employment Dispersed Population	High	566	3,003	238	284	729	51	107	3	0
		Mid		4,039	318	375	926	65	83	2	0
		Low		5,279	416	465	1,080	76	58	1	0
3	Low RSLR Business-as-Usual Compact Population	High	551	2,545	224	277	729	50	107	3	0
		Mid		3,600	296	309	825	55	83	3	0
		Low		4,432	393	377	1,027	69	58	2	0
4	High RSLR Business-as-Usual Compact Population	High	566	2,870	248	313	782	56	107	3	0
		Mid		3,850	334	388	962	69	83	2	0
		Low		4,863	465	462	1,105	78	58	1	0

Other Results			Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Construction Time (years)		15	After 50 yrs (% of baseline)	103	101	103	101
Direct Wetland Impacts (acres)		0	After 100 yrs (% of baseline)	106	100	106	100
Indirect Impacts (unitless)		0	Present Value of Life Cycle Costs ($ Millions)				
Spatial Integrity (unitless)		0.44	Coastal Component	10,783	11,077	10,783	11,077
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)	Nonstructural Component	0	0	0	0
	1 / 2	3,774 3,877	Structural Component	0	0	0	0
	3 / 4	3,774 3,877	Total Project	10,783	11,077	10,783	11,077

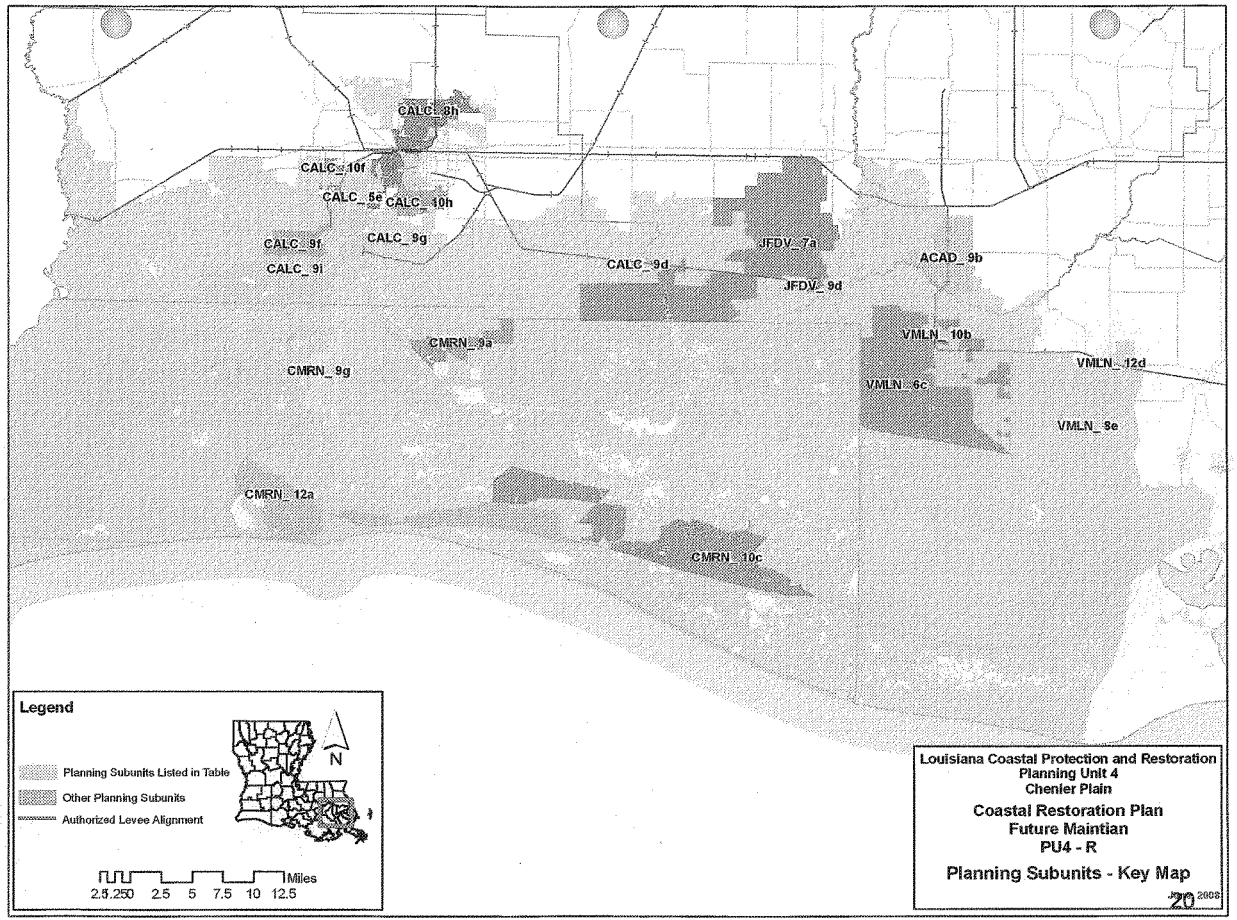
2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 4
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	Coastal Plan
10-year	472	472	725	726	511	511	794	795	
100-year	3,034	3,023	4,142	4,125	3,315	3,206	5,183	5,224	
400-year	6,592	6,577	7,874	7,869	8,001	7,967	9,283	9,263	Coastal Restoration Alt
1,000-year	10,316	10,304	11,581	11,560	11,241	11,229	12,313	12,299	
2,000-year	12,755	12,731	13,904	13,898	13,422	13,395	14,373	14,387	

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels.

2006


Westlake
Sulphur
Lake Charles
Vinton
Jennings
Crowley
Gueydan
Kaplan
Abbeville
Intracoastal City
Cameron
Calcasieu Lake
West Cove
Grand Lake
White Lake
1-0
1-1
1-2
1-3
1-4
1-5
1-6
1-7
1-10
1-11
1-12
1-13
1-14
1-15
1-16
Legend
Primary Roads
Shoreline Stabilization
Planning Unit Boundary
Marsh Creation
N
5 2.5 0 5 10 15 20 25 Miles
Louisiana Coastal Protection and Restoration
Planning Unit 4
Chenier Plain
Coastal Restoration Plan
PU4 - R1
November 2007

2007


CALC_8h
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CALC_5e
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CALC_9f
CALC_9g
CALC_9i
CALC_9d
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JFDV_9d
ACAD_9b
CMRN_9a
CMRN_9g
VMLN_10b
VMLN_12d
VMLN_6c
VMLN_9e
CMRN_12a
CMRN_10c
Legend
Planning Subunits Listed in Table
Other Planning Subunits
Authorized Levee Alignment
N
Miles
2.5 2.5 0 2.5 5 7.5 10 12.5
Louisiana Coastal Protection and Restoration
Planning Unit 4
Chenier Plain
Coastal Restoration Plan
Future Maintian
PU4 - R
Planning Subunits - Key Map
2008
20

2008

Alternative: PU4-R1

Water Surface Elevations (feet - NAVD88 2004.65)

Planning Sub Unit	2010 (Base) Conditions*						2060 (Future) Conditions					
	100-yr Event		400-year Event		1,000-yr Event		100-yr Event		400-year Event		1,000-yr Event	
	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project
ACAD_9b	7.8	7.8	9.4	9.4	12.2	12.2	10.4	10.4	12.0	12.0	14.8	14.8
CALC_10f	6.0	6.0	8.1	8.1	9.7	9.7	8.6	8.6	10.7	10.7	12.3	12.3
CALC_10h	5.5	5.5	6.1	6.1	9.1	9.1	8.1	8.1	8.7	8.7	11.7	11.7
CALC_5e	7.8	7.8	8.5	8.5	12.1	12.1	10.4	10.4	11.1	11.1	14.7	14.7
CALC_8h	7.8	7.8	10.7	10.7	12.8	12.8	10.4	10.4	13.3	13.3	15.4	15.4
CALC_9d	7.8	7.8	9.7	9.7	13.6	13.6	10.4	10.4	12.3	12.3	16.2	16.2
CALC_9f	8.8	8.8	13.6	13.6	16.0	16.0	11.4	11.4	16.2	16.2	18.6	18.6
CALC_9g	10.9	10.9	14.6	14.6	17.1	17.1	13.5	13.5	17.2	17.2	19.7	19.7
CALC_9i	8.4	8.4	12.8	12.8	15.3	15.3	11.0	11.0	15.4	15.4	17.9	17.9
CMRN_10c	11.1	11.1	14.8	14.8	16.8	16.8	13.8	13.7	17.1	17.4	18.8	19.4
CMRN_12a	13.0	13.0	16.9	16.9	19.0	19.0	15.3	15.6	18.9	19.5	20.7	21.6
CMRN_9a	9.5	9.5	14.1	14.1	16.3	16.3	12.1	12.1	16.7	16.7	18.9	18.9
CMRN_9g	9.6	9.6	13.1	13.1	15.2	15.2	12.7	12.2	16.4	15.7	18.6	17.8
JFDV_7a	7.5	7.5	11.9	11.9	14.7	14.7	10.1	10.1	14.5	14.5	17.3	17.3
JFDV_9d	6.4	6.4	11.1	11.1	13.5	13.5	9.0	9.0	13.7	13.7	16.1	16.1
VMLN_10b	7.8	7.8	11.2	11.2	13.5	13.5	10.4	10.4	13.8	13.8	16.1	16.1
VMLN_12d	7.8	7.8	11.1	11.1	14.3	14.3	10.4	10.4	13.7	13.7	16.9	16.9
VMLN_6c	7.8	7.8	10.7	10.7	12.7	12.7	10.4	10.4	13.3	13.3	15.3	15.3
VMLN_8e	8.6	8.6	12.1	12.1	14.2	14.2	11.2	11.2	14.7	14.7	16.8	16.8

Evaluation Parameters				
	Confidence Level:	90%	Levee Design:	No Friction Waves
	Future Relative Sea Level Rise:	2.6 feet	Levee Overtopping:	No Friction Waves

* With and without project base conditions (2010) are the same for coastal restoration only plans. □

2009

Planning Unit:	4	Alt. No.:	PL 3-100	Category:	Coastal Restoration + Nonstructural Measures
Alternative Description:	Sustain coastal landscape through restoration. Implement comprehensive 100-year nonstructural measures.				
Coastal Component:	R1		Nonstructural Component:		100-yr stand alone measures
Structural Component:	No new levees or increases in risk reduction level for existing levees.				

Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	660	2,072	103	89	272	16	107	3	0
		Mid		3,138	143	111	349	19	83	3	0
		Low		4,106	206	166	505	30	58	2	0
2	High RSLR High Employment Dispersed Population	High	675	2,262	108	96	280	17	107	3	0
		Mid		3,260	157	157	429	27	83	2	0
		Low		4,374	229	208	535	33	58	1	0
3	Low RSLR Business-as-Usual Compact Population	High	660	1,938	103	84	263	15	107	3	0
		Mid		2,922	145	107	339	19	83	3	0
		Low		3,755	211	162	508	30	58	2	0
4	High RSLR Business-as-Usual Compact Population	High	675	2,099	108	93	275	16	107	3	0
		Mid		3,044	159	149	426	27	83	2	0
		Low		3,973	241	193	529	32	58	1	0

Other Results	
Construction Time (years)	15
Direct Wetland Impacts (acres)	0
Indirect Impacts (unitless)	0
Spatial Integrity (unitless)	0.44

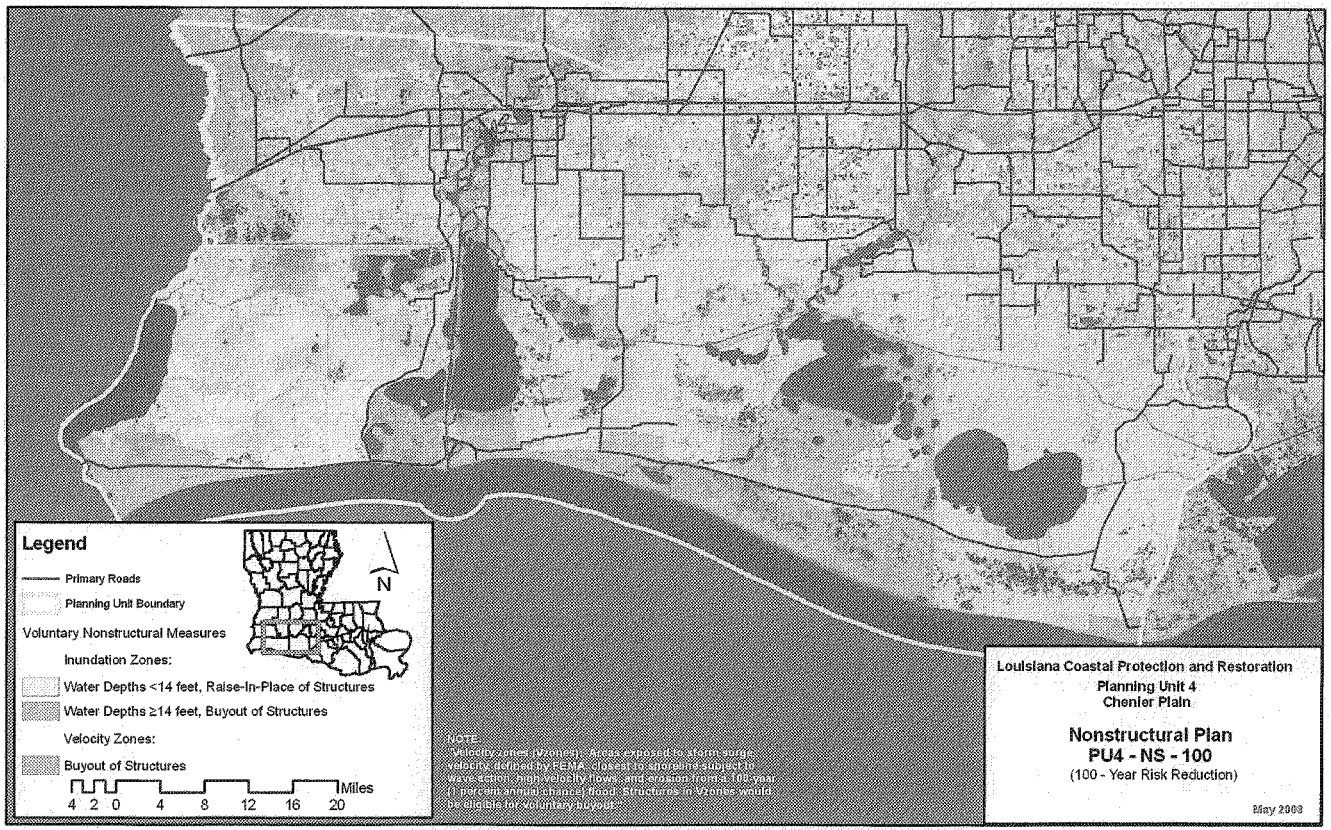
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)	
	1 / 2	4,524	4,627
	3 / 4	4,525	4,628

Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
After 50 yrs (% of baseline)	103	101	103	101
After 100 yrs (% of baseline)	106	100	106	100
Present Value of Life Cycle Costs ($ Millions)				
Coastal Component	10,783	11,077	10,783	11,077
Nonstructural Component	2,142	2,142	2,145	2,145
Structural Component	0	0	0	0
Total Project	12,925	13,220	12,928	13,222

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 4
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	
10-year	472	151	725	181	511	152	794	182	Nonstructural Plan
100-year	3,034	1,249	4,142	2,570	3,315	1,209	5,183	2,969	
400-year	6,592	5,340	7,874	6,737	8,001	5,530	9,283	6,818	
1,000-year	10,316	9,206	11,581	10,545	11,241	8,784	12,313	9,869	
2,000-year	12,755	11,720	13,904	12,999	13,422	10,972	14,373	11,978	100-year Design

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels.

2010


Legend
Primary Roads
Planning Unit Boundary
Voluntary Nonstructural Measures
Inundation Zones:
Water Depths <14 feet, Raise-In-Place of Structures
Water Depths ≥14 feet, Buyout of Structures
Velocity Zones:
Buyout of Structures
4 2 0 4 8 12 16 20 Miles
N
NOTE:
"Velocity zones (Vzones): Areas exposed to storm surge, velocity defined by FEMA, closest to shoreline subject to wave action, high velocity flows, and erosion from a 100-year (1 percent annual chance) flood. Structures in Vzones would be eligible for voluntary buyout."
Louisiana Coastal Protection and Restoration
Planning Unit 4
Chenier Plain
Nonstructural Plan
PU4 - NS - 100
(100 - Year Risk Reduction)
May 2008

2011

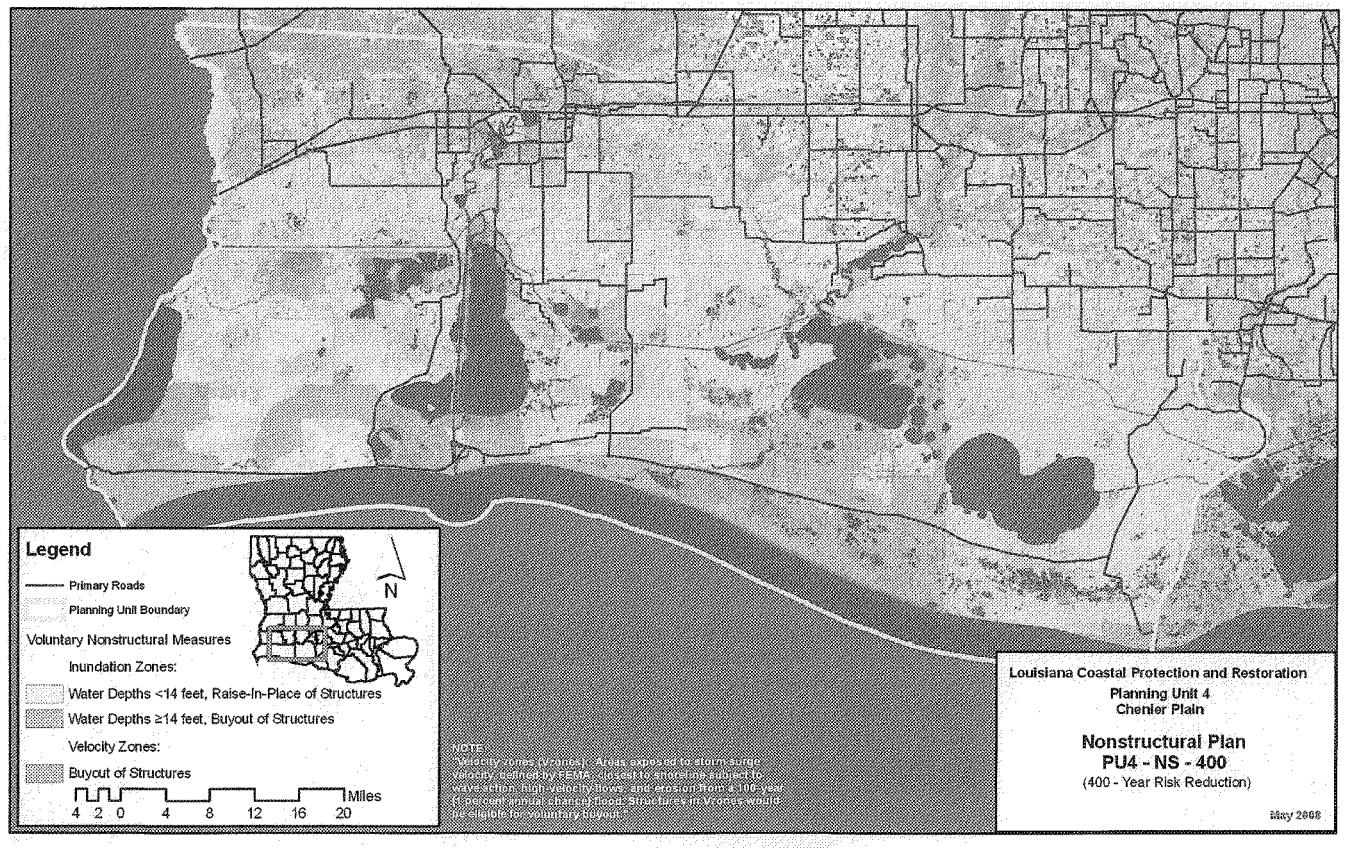
Planning Ur	4	Alt. No.:	PL	S-400	Category:	Coastal Restoration + Nonstructu	Measures
Alternative Description:	Sustain coastal landscape through restoration. Implement comprehensive 400-year nonstructural measures.						
Coastal Component:	R1			Nonstructural Component:		400-yr stand alone measures	
Structural Component:	No new levees or increases in risk reduction level for existing levees.						

Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	727	1,990	97	68	234	12	107	3	0
		Mid		3,056	127	81	282	14	83	3	0
		Low		4,024	169	105	369	19	58	2	0
2	High RSLR High Employment Dispersed Population	High	742	2,180	99	70	237	12	107	3	0
		Mid		3,178	131	92	295	15	83	2	0
		Low		4,292	176	107	376	19	58	1	0
3	Low RSLR Business-as-Usual Compact Population	High	723	1,861	98	64	227	11	107	3	0
		Mid		2,845	129	76	270	13	83	3	0
		Low		3,678	173	98	357	18	58	2	0
4	High RSLR Business-as-Usual Compact Population	High	739	2,022	99	66	229	12	107	3	0
		Mid		2,967	132	85	281	14	83	2	0
		Low		3,896	180	99	363	18	58	1	0

Other Results			Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Construction Time (years)		15	After 50 yrs (% of baseline)	103	101	103	101
Direct Wetland Impacts (acres)		0	After 100 yrs (% of baseline)	106	100	106	100
Indirect Impacts (unitless)		0	Present Value of Life Cycle Costs ($ Millions)				
Spatial Integrity (unitless)		0.44	Coastal Component	10,783	11,077	10,783	11,077
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)	Nonstructural Component	3,455	3,455	3,392	3,392
	1 / 2	4,983	Structural Component	0	0	0	0
	3 / 4	4,961	Total Project	14,238	14,532	14,176	14,470

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 4
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	
10-year	472	142	725	165	511	144	794	166	Nonstructural Plan
100-year	3,034	504	4,142	682	3,315	507	5,183	668	
400-year	6,592	2,214	7,874	4,520	8,001	1,973	9,283	4,524	
1,000-year	10,316	7,707	11,581	9,629	11,241	7,162	12,313	8,855	
2,000-year	12,755	10,905	13,904	12,344	13,422	10,061	14,373	11,202	400-year Design

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels.


Legend
Primary Roads
Planning Unit Boundary
Voluntary Nonstructural Measures
Inundation Zones:
Water Depths <14 feet, Raise-In-Place of Structures
Water Depths ≥14 feet, Buyout of Structures
Velocity Zones:
Buyout of Structures
4 2 0 4 8 12 16 20 Miles
N
NOTE:
Velocity zones (V-zones) - Areas exposed to storm surge velocity defined by FEMA. Located in shoreline subject to wave action, high velocity flows, and erosion from a 100 year (1percent annual chance) flood. Structures in V-zones would be eligible for voluntary buyout.
Louisiana Coastal Protection and Restoration
Planning Unit 4
Chenier Plain
Nonstructural Plan
PU4 - NS - 400
(400 - Year Risk Reduction)
May 2008

Planning Unit:	4	Alt. No.:	PU 3-1000	Category:	Coastal Restoration + Nonstructural Measures
Alternative Description:	Sustain coastal landscape through restoration. Implement comprehensive 1000-year nonstructural measures.				
Coastal Component:	R1		Nonstructural Component:		1000-yr stand alone measures
Structural Component:	No new levees or increases in risk reduction level for existing levees.				

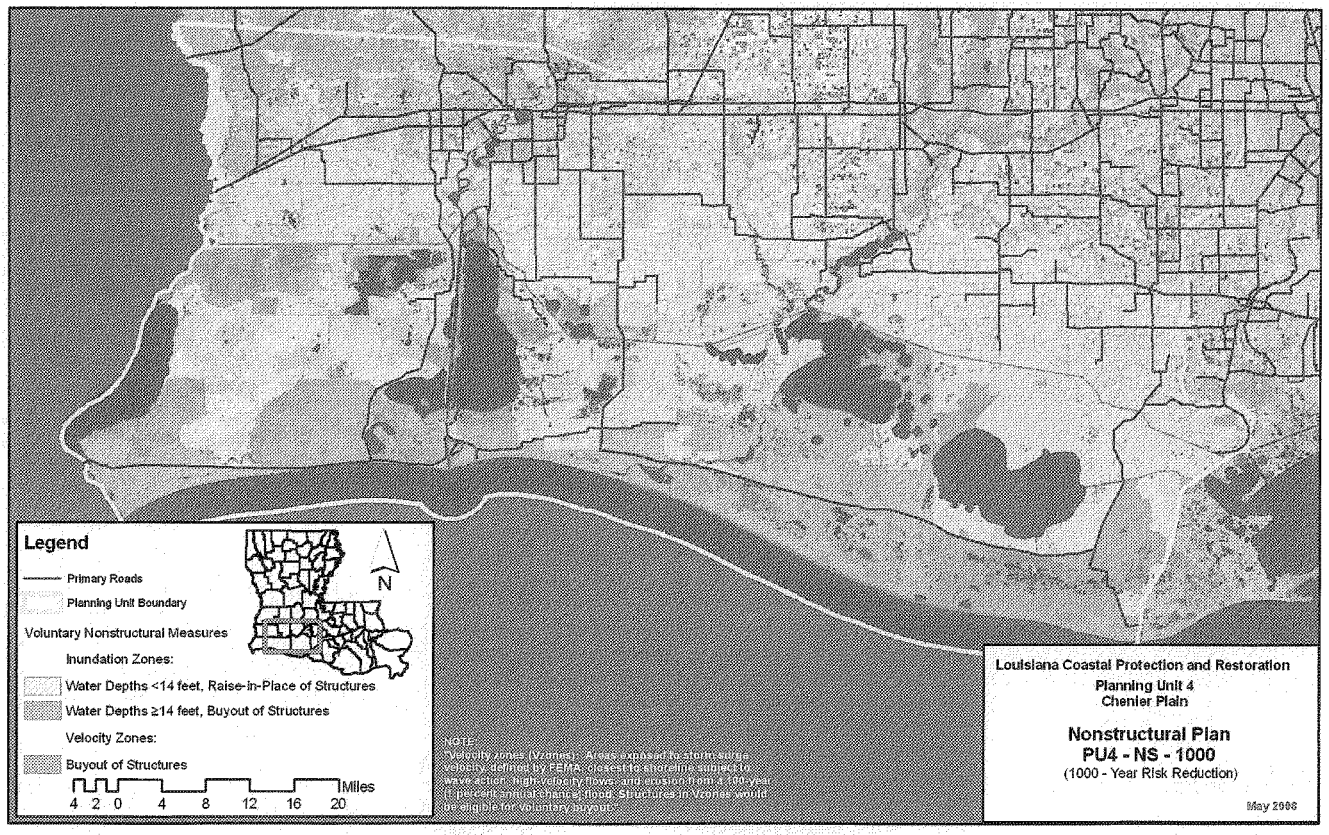
Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	796	1,876	93	67	232	12	107	3	0
		Mid		2,942	122	74	266	13	83	3	0
		Low		3,911	156	86	321	16	58	2	0
2	High RSLR High Employment Dispersed Population	High	811	2,066	95	68	233	12	107	3	0
		Mid		3,063	123	77	271	13	83	2	0
		Low		4,178	160	90	331	16	58	1	0
3	Low RSLR Business-as-Usual Compact Population	High	803	1,741	94	63	225	11	107	3	0
		Mid		2,725	123	70	256	12	83	3	0
		Low		3,558	160	81	312	15	58	2	0
4	High RSLR Business-as-Usual Compact Population	High	818	1,902	95	64	226	11	107	3	0
		Mid		2,846	125	72	261	13	83	2	0
		Low		3,776	163	85	320	15	58	1	0

Other Results			Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Construction Time (years)		15	After 50 yrs (% of baseline)	103	101	103	101
Direct Wetland Impacts (acres)		0	After 100 yrs (% of baseline)	106	100	106	100
Indirect Impacts (unitless)		0	Present Value of Life Cycle Costs ($ Millions)				
Spatial Integrity (unitless)		0.44	Coastal Component	10,783	11,077	10,783	11,077
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)	Nonstructural Component	4,807	4,807	4,955	4,955
	1 / 2	5,457	Structural Component	0	0	0	0
	3 / 4	5,508	Total Project	15,590	15,884	15,738	16,032

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 4
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	
10-year	472	121	725	143	511	121	794	143	Nonstructural Plan
100-year	3,034	458	4,142	557	3,315	454	5,183	550	
400-year	6,592	935	7,874	1,466	8,001	820	9,283	1,229	
1,000-year	10,316	3,146	11,581	6,250	11,241	2,561	12,313	5,665	1000-year Design
2,000-year	12,755	8,278	13,904	10,868	13,422	7,423	14,373	9,552	

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels.

2014


Legend
Primary Roads
Planning Unit Boundary
Voluntary Nonstructural Measures
Inundation Zones:
Water Depths <14 feet, Raise-in-Place of Structures
Water Depths ≥14 feet, Buyout of Structures
Velocity Zones:
Buyout of Structures
4 2 0 4 8 12 16 20 Miles
N
NOTE:
"Velocity zones (Vzones): Areas exposed to storm surge velocity, defined by FEMA, closest to shoreline subject to wave action, high velocity flows, and erosion from a 100-year (1 percent annual chance) flood. Structures in Vzones would be eligible for voluntary buyout."
Louisiana Coastal Protection and Restoration
Planning Unit 4
Chenier Plain
Nonstructural Plan
PU4 - NS - 1000
(1000 - Year Risk Reduction)
May 2006

2015

Planning Ur	4	Alt. No.:	PL -100-1	Category:	Coastal Restoration + Structura easures
Alternative Description:	Sustain coastal landscape through restoration. Construct a continuous levee (with gates) along the GIWW plus a ring levee to the west of the Calcasieu River and a series of levees within Lake Charles to separate the river from the land at the 100-year de				
Coastal Component:	R1		Nonstructural Component:		None
Structural Component:	See alternative description above.				

Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	1,163	2,266	200	192	607	34	140	3	0
		Mid		2,961	247	219	697	38	116	3	0
		Low		3,672	307	272	851	47	91	3	0
2	High RSLR High Employment Dispersed Population	High	1,192	2,403	209	211	633	37	140	3	0
		Mid		3,045	260	275	767	46	116	3	0
		Low		3,813	324	347	902	53	91	3	0
3	Low RSLR Business-as-Usual Compact Population	High	1,163	2,178	212	212	654	38	140	3	0
		Mid		2,815	268	240	739	42	116	3	0
		Low		3,474	346	279	871	49	91	3	0
4	High RSLR Business-as-Usual Compact Population	High	1,192	2,296	224	240	692	42	140	3	0
		Mid		2,917	293	284	800	48	116	3	0
		Low		3,614	382	343	917	55	91	3	0

Other Results	
Construction Time (years)	10
Direct Wetland Impacts (acres)	2,200
Indirect Impacts (unitless)	-5
Spatial Integrity (unitless)	0.44

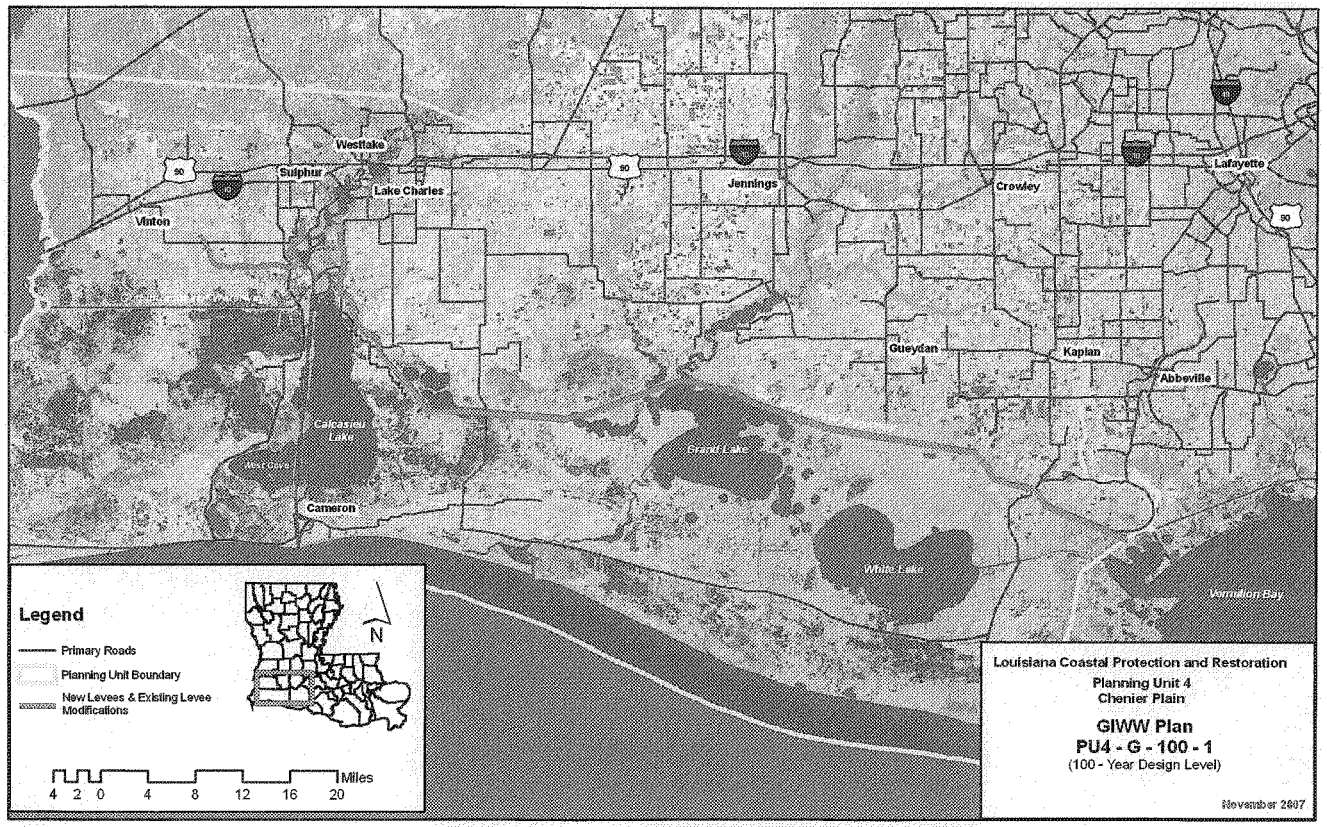
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)	
	1 / 2	8,065	8,266
	3 / 4	8,065	8,266

Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
After 50 yrs (% of baseline)	103	101	103	101
After 100 yrs (% of baseline)	106	100	106	100
Present Value of Life Cycle Costs ($ Millions)				
Coastal Component	10,783	11,077	10,783	11,077
Nonstructural Component	0	0	0	0
Structural Component	11,989	12,272	11,989	12,272
Total Project	22,773	23,349	22,773	23,349

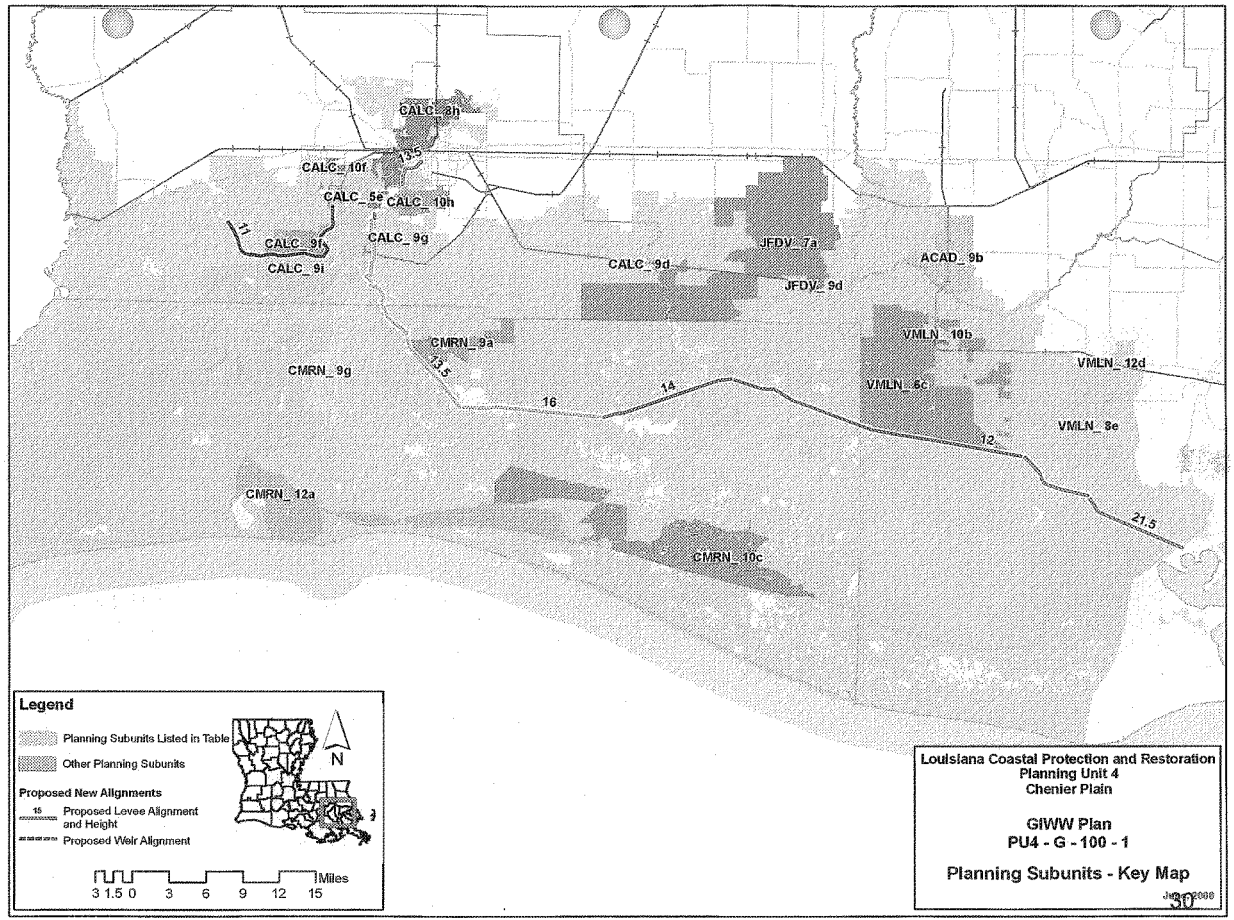
2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 4
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	Structural Plan
10-year	472	394	725	562	511	468	794	674	GIWW Alt
100-year	3,034	1,867	4,142	2,232	3,315	2,575	5,183	3,735	
400-year	6,592	4,220	7,874	4,668	8,001	6,334	9,283	6,817	100-year Design
1,000-year	10,316	8,170	11,581	8,669	11,241	9,787	12,313	10,411	
2,000-year	12,755	9,113	13,904	9,541	13,422	10,778	14,373	11,094	

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels.

2016


Westlake
Sulphur
Lake Charles
Vinton
Jennings
Crowley
Lafayette
Gueydan
Kaplan
Abbeville
Calcasieu Lake
Grand Lake
White Lake
Vermilion Bay
Cameron
Legend
Primary Roads
Planning Unit Boundary
New Levees & Existing Levee Modifications
N
Miles
4 2 0 4 8 12 16 20
Louisiana Coastal Protection and Restoration
Planning Unit 4
Chenier Plain
GIWW Plan
PU4 - G - 100 - 1
(100 - Year Design Level)
November 2007

2017


CALC_8h
CALC_10f
CALC_5e
CALC_10h
CALC_9g
CALC_9f
CALC_9i
CALC_9d
JFDV_7a
JFDV_9d
ACAD_9b
CMRN_9a
CMRN_9g
VMLN_10b
VMLN_12d
VMLN_8c
VMLN_8e
CMRN_12a
CMRN_10c
13.5
11
16
14
12
21.5
Legend
Planning Subunits Listed in Table
Other Planning Subunits
Proposed New Alignments
15 Proposed Levee Alignment and Height
Proposed Weir Alignment
N
3 1.5 0 3 6 9 12 15 Miles
Louisiana Coastal Protection and Restoration
Planning Unit 4
Chenier Plain
GIWW Plan
PU4 - G - 100 - 1
Planning Subunits - Key Map

2018

Alternative: PU4-G-100-1

Water Surface Elevations (feet - NAVD88 2004.65)

Planning Sub Unit	2010 (Base) Conditions						2060 (Future) Conditions					
	100-yr Event		400-year Event		1,000-yr Event		100-yr Event		400-year Event		1,000-yr Event	
	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project
ACAD_9b	7.8	2.7	9.4	7.5	12.2	12.0	10.4	2.7	12.0	7.5	14.8	12.0
CALC_10f	6.0	6.0	8.1	8.1	9.7	9.7	8.6	8.6	10.7	10.7	12.3	12.3
CALC_10h	5.5	10.2	6.1	13.5	9.1	13.5	8.1	10.2	8.7	13.5	11.7	13.5
CALC_5e	7.8	8.3	8.5	13.5	12.1	13.5	10.4	8.3	11.1	13.5	14.7	13.5
CALC_8h	7.8	7.8	10.7	10.7	12.8	12.8	10.4	10.4	13.3	13.3	15.4	15.4
CALC_9d	7.8	2.6	9.7	6.7	13.6	13.3	10.4	2.6	12.3	6.7	16.2	13.3
CALC_9f	8.8	7.2	13.6	11.0	16.0	11.0	11.4	7.2	16.2	11.0	18.6	11.0
CALC_9g	10.9	4.3	14.6	12.4	17.1	13.5	13.5	4.3	17.2	12.4	19.7	13.5
CALC_9i	8.4	8.4	12.8	12.8	15.3	15.3	11.0	11.0	15.4	15.4	17.9	17.9
CMRN_10c	11.1	11.8	14.8	15.5	16.8	17.5	13.8	14.4	17.1	18.1	18.8	20.1
CMRN_12a	13.0	14.4	16.9	18.3	19.0	20.4	15.3	17.0	18.9	20.9	20.7	23.0
CMRN_9a	9.5	2.6	14.1	6.7	16.3	13.3	12.1	2.6	16.7	6.7	18.9	13.3
CMRN_9g	9.6	10.8	13.1	15.0	15.2	17.2	12.7	13.4	16.4	17.6	18.6	19.8
JFDV_7a	7.5	2.6	11.9	6.7	14.7	13.3	10.1	2.6	14.5	6.7	17.3	13.3
JFDV_9d	6.4	2.7	11.1	7.5	13.5	12.0	9.0	2.7	13.7	7.5	16.1	12.0
VMLN_10b	7.8	2.7	11.2	7.5	13.5	12.0	10.4	2.7	13.8	7.5	16.1	12.0
VMLN_12d	7.8	2.7	11.1	7.5	14.3	12.0	10.4	2.7	13.7	7.5	16.9	12.0
VMLN_6c	7.8	2.7	10.7	7.5	12.7	12.0	10.4	2.7	13.3	7.5	15.3	12.0
VMLN_8e	8.6	2.7	12.1	7.5	14.2	12.0	11.2	2.7	14.7	7.5	16.8	12.0

Evaluation Parameters				
	Confidence Level:	90%	Levee Design:	No Friction Waves
	Future Relative Sea Level Rise:	2.6 feet	Levee Overtopping:	No Friction Waves

2019

Planning Unit:	4	Alt. No.:	PL 100-2	Category:	Coastal Restoration + Structural Measures
Alternative Description:	Sustain coastal landscape through restoration. Construct a continuous levee (with gates) along the GIWW plus a ring levee to the west of the Calcasieu River and a series of levees within Lake Charles to separate the river from the land at the 100-year de				
Coastal Component:	R1	Nonstructural Component:		None	
Structural Component:	See alternative description above.				

Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	1,152	2,384	214	246	712	45	139	2	0
		Mid		3,085	262	274	806	49	115	0	0
		Low		3,800	324	326	959	58	90	0	0
2	High RSLR High Employment Dispersed Population	High	1,182	2,525	225	266	740	48	139	2	0
		Mid		3,170	277	330	876	56	115	0	0
		Low		3,943	342	402	1,010	64	90	0	0
3	Low RSLR Business-as-Usual Compact Population	High	1,152	2,271	224	258	741	47	139	2	0
		Mid		2,913	281	287	830	51	115	0	0
		Low		3,576	360	326	961	58	90	0	0
4	High RSLR Business-as-Usual Compact Population	High	1,182	2,391	238	287	781	51	139	2	0
		Mid		3,015	307	331	891	58	115	0	0
		Low		3,716	397	390	1,007	64	90	0	0

Other Results			Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Construction Time (years)		10	After 50 yrs (% of baseline)	103	101	103	101
Direct Wetland Impacts (acres)		1,800	After 100 yrs (% of baseline)	106	106	106	100
Indirect Impacts (unitless)		-5	Present Value of Life Cycle Costs ($ Millions)				
Spatial Integrity (unitless)		0.44	Coastal Component	10,783	11,077	10,783	11,077
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)	Nonstructural Component	0	0	0	0
	1 / 2	7,995	Structural Component	11,785	12,065	11,785	12,065
	3 / 4	7,995	Total Project	22,568	23,143	22,568	23,143

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)								
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4	
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj
10-year	472	464	725	661	511	526	794	758
100-year	3,034	2,113	4,142	2,534	3,315	2,785	5,183	3,991
400-year	6,592	4,588	7,874	5,055	8,001	6,647	9,283	7,152
1,000-year	10,316	8,435	11,581	8,961	11,241	10,013	12,313	10,649
2,000-year	12,755	9,247	13,904	9,681	13,422	10,913	14,373	11,239

Planning Unit 4

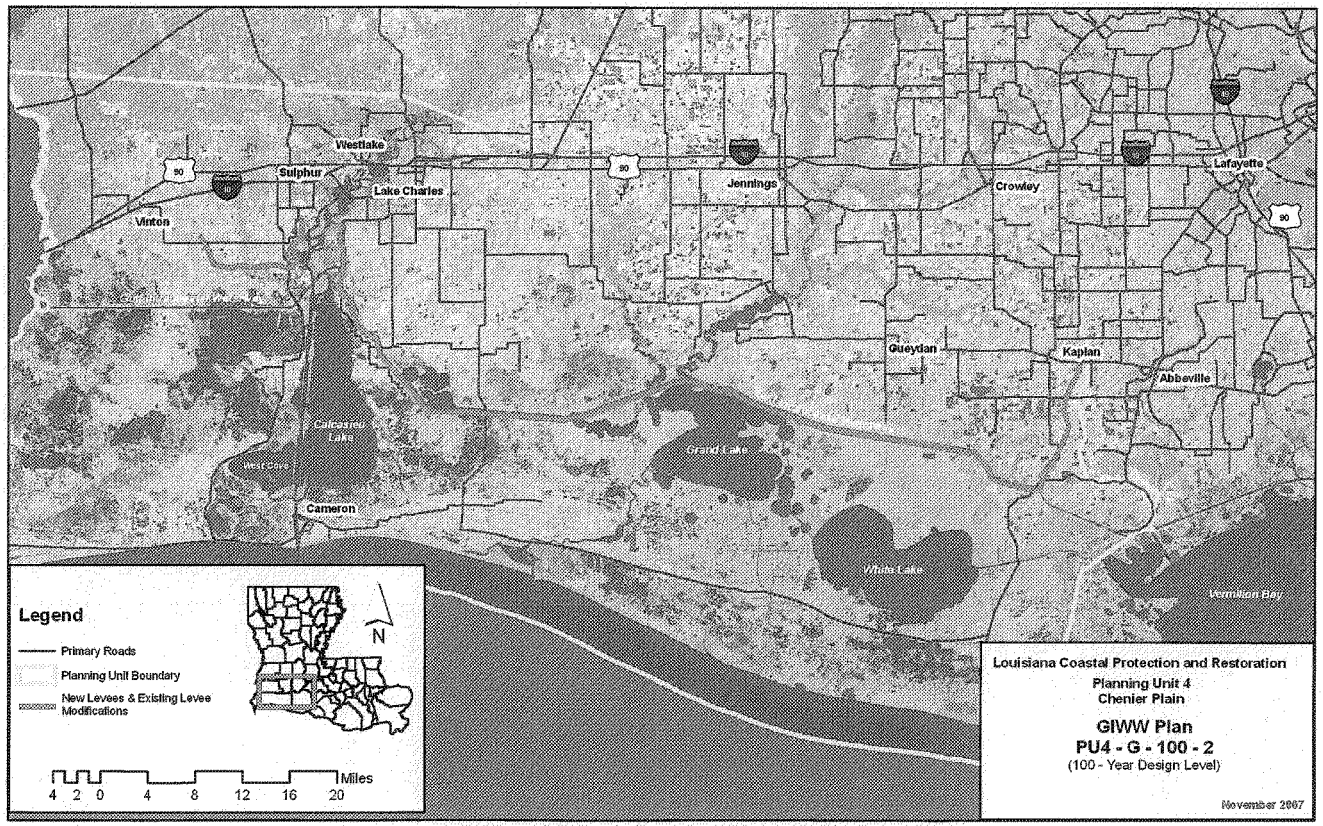
Structural Plan

GIWW Alt

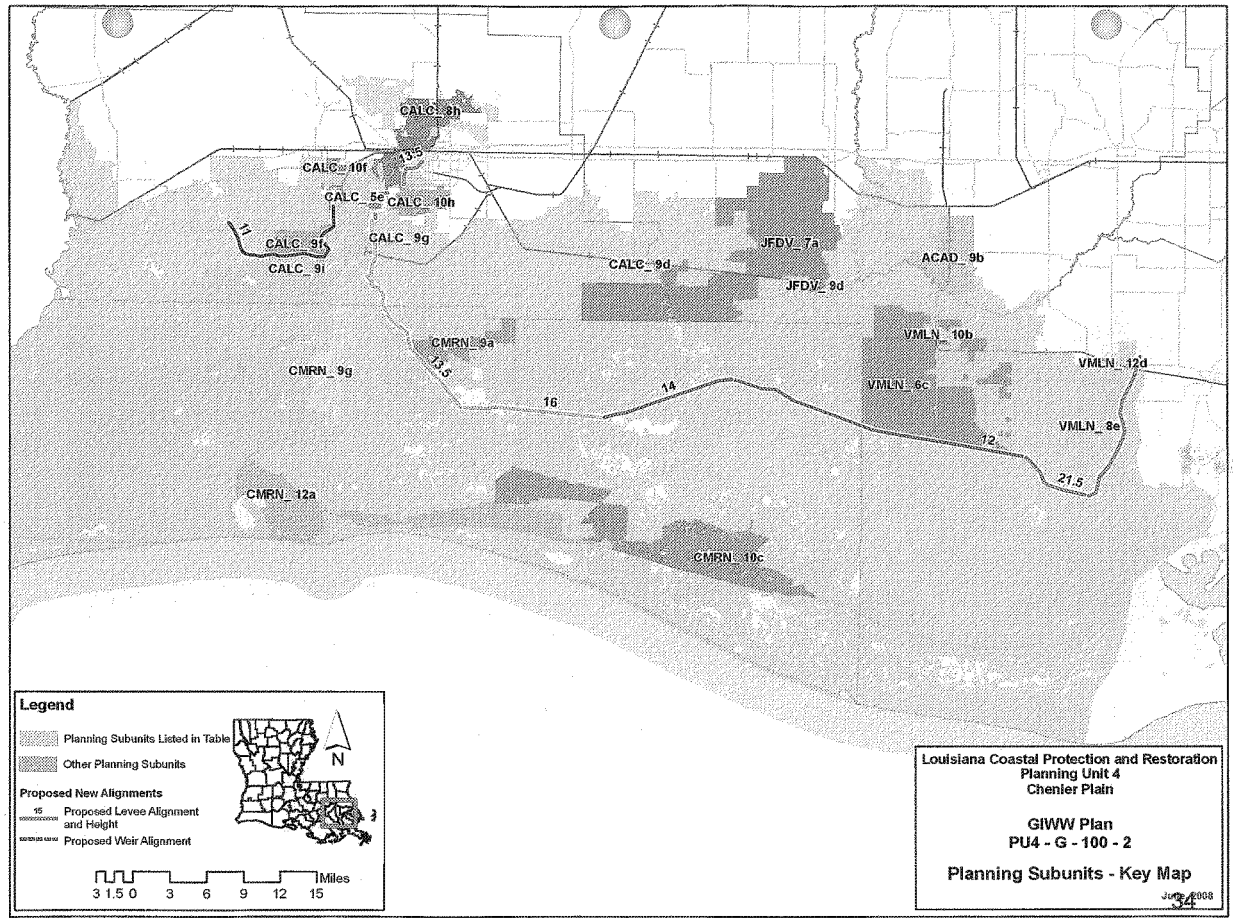
100-year Design

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels.

2020


Westlake
Sulphur
Lake Charles
Vinton
Jennings
Crowley
Lafayette
Gueydan
Kaplan
Abbeville
Calcasieu Lake
West Cove
Cameron
Grand Lake
White Lake
Vermilion Bay
Legend
Primary Roads
Planning Unit Boundary
New Levees & Existing Levee Modifications
N
Miles
4 2 0 4 8 12 16 20
Louisiana Coastal Protection and Restoration
Planning Unit 4
Chenier Plain
GIWW Plan
PU4 - G - 100 - 2
(100 - Year Design Level)
November 2007

2021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VMLN_12d
VMLN_6c
VMLN_8e
CMRN_12a
CMRN_10c
13.5
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21.5
Legend
Planning Subunits Listed in Table
Other Planning Subunits
Proposed New Alignments
15 Proposed Levee Alignment and Height
Proposed Weir Alignment
N
Miles
3 1.5 0 3 6 9 12 15
Louisiana Coastal Protection and Restoration
Planning Unit 4
Chenier Plain
GIWW Plan
PU4 - G - 100 - 2
Planning Subunits - Key Map
June 2008

2022

Alternative: PU4-G-100-2

Water Surface Elevations (feet - NAVD88 2004.65)

Planning Sub Unit	2010 (Base) Conditions						2060 (Future) Conditions					
	100-yr Event		400-year Event		1,000-yr Event		100-yr Event		400-year Event		1,000-yr Event	
	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project
ACAD_9b	7.8	2.7	9.4	7.7	12.2	12.0	10.4	2.7	12.0	7.7	14.8	12.0
CALC_10f	6.0	6.0	8.1	8.1	9.7	9.7	8.6	8.6	10.7	10.7	12.3	12.3
CALC_10h	5.5	10.2	6.1	13.5	9.1	13.5	8.1	10.2	8.7	13.5	11.7	13.5
CALC_5e	7.8	8.3	8.5	13.5	12.1	13.5	10.4	8.3	11.1	13.5	14.7	13.5
CALC_8h	7.8	7.8	10.7	10.7	12.8	12.8	10.4	10.4	13.3	13.3	15.4	15.4
CALC_9d	7.8	2.6	9.7	6.7	13.6	13.3	10.4	2.6	12.3	6.7	16.2	13.3
CALC_9f	8.8	7.2	13.6	11.0	16.0	11.0	11.4	7.2	16.2	11.0	18.6	11.0
CALC_9g	10.9	4.3	14.6	12.4	17.1	13.5	13.5	4.3	17.2	12.4	19.7	13.5
CALC_9i	8.4	8.4	12.8	12.8	15.3	15.3	11.0	11.0	15.4	15.4	17.9	17.9
CMRN_10c	11.1	11.8	14.8	15.5	16.8	17.5	13.8	14.4	17.1	18.1	18.8	20.1
CMRN_12a	13.0	14.4	16.9	18.3	19.0	20.4	15.3	17.0	18.9	20.9	20.7	23.0
CMRN_9a	9.5	2.6	14.1	6.7	16.3	13.3	12.1	2.6	16.7	6.7	18.9	13.3
CMRN_9g	9.6	10.8	13.1	15.0	15.2	17.2	12.7	13.4	16.4	17.6	18.6	19.8
JFDV_7a	7.5	2.6	11.9	6.7	14.7	13.3	10.1	2.6	14.5	6.7	17.3	13.3
JFDV_9d	6.4	2.7	11.1	7.7	13.5	12.0	9.0	2.7	13.7	7.7	16.1	12.0
VMLN_10b	7.8	2.7	11.2	7.7	13.5	12.0	10.4	2.7	13.8	7.7	16.1	12.0
VMLN_12d	7.8	2.7	11.1	7.7	14.3	12.0	10.4	2.7	13.7	7.7	16.9	12.0
VMLN_6c	7.8	2.7	10.7	7.7	12.7	12.0	10.4	2.7	13.3	7.7	15.3	12.0
VMLN_8e	8.6	2.7	12.1	7.7	14.2	12.0	11.2	2.7	14.7	7.7	16.8	12.0

Evaluation Parameters				
	Confidence Level:	90%	Levee Design:	No Friction Waves
	Future Relative Sea Level Rise:	2.6 feet	Levee Overtopping:	No Friction Waves

2023

Planning Unit:	4	Alt. No.:	PU 400-3	Category:	Coastal Restoration + Structural Measures
Alternative Description:	Sustain coastal landscape through restoration. Construct a continuous 12-foot levee (with gates) along the GIWW plus a ring levee to the west of the Calcasieu River and a series of levees within Lake Charles to separate the river from the land. Includes s				
Coastal Component:	R1	Nonstructural Component:	None		
Structural Component:	See alternative description above.				

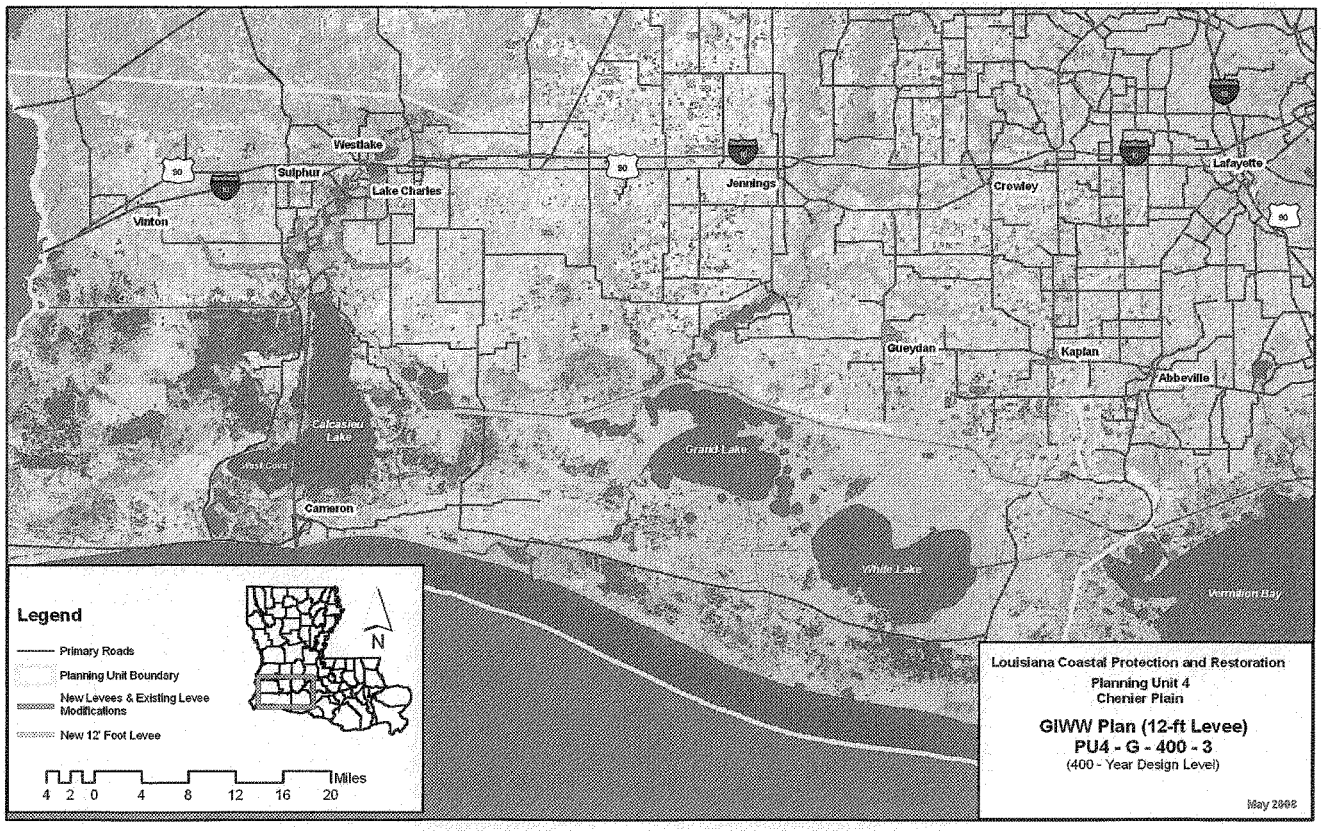
Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	1,150	2,576	215	246	712	45	139	1	0
		Mid		3,196	261	273	796	48	115	1	0
		Low		3,899	324	328	958	58	90	1	0
2	High RSLR High Employment Dispersed Population	High	1,179	2,716	226	266	740	48	139	1	0
		Mid		3,281	276	329	866	56	115	1	0
		Low		4,041	342	404	1,009	64	90	0	0
3	Low RSLR Business-as-Usual Compact Population	High	1,150	2,454	225	258	741	47	139	1	0
		Mid		3,033	280	285	818	50	115	1	0
		Low		3,679	359	327	958	58	90	1	0
4	High RSLR Business-as-Usual Compact Population	High	1,179	2,574	239	287	781	51	139	1	0
		Mid		3,135	306	329	878	57	115	1	0
		Low		3,818	396	390	1,005	64	90	0	0

Other Results			Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Construction Time (years)		10	After 50 yrs (% of baseline)	103	101	103	101
Direct Wetland Impacts (acres)		2,500	After 100 yrs (% of baseline)	106	100	106	100
Indirect Impacts (unitless)		-6	Present Value of Life Cycle Costs ($ Millions)				
Spatial Integrity (unitless)		0.44	Coastal Component	10,783	11,077	10,783	11,077
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)	Nonstructural Component	0	0	0	0
	1 / 2	7,985	Structural Component	11,732	12,012	11,732	12,012
	3 / 4	7,985	Total Project	22,515	23,089	22,515	23,089

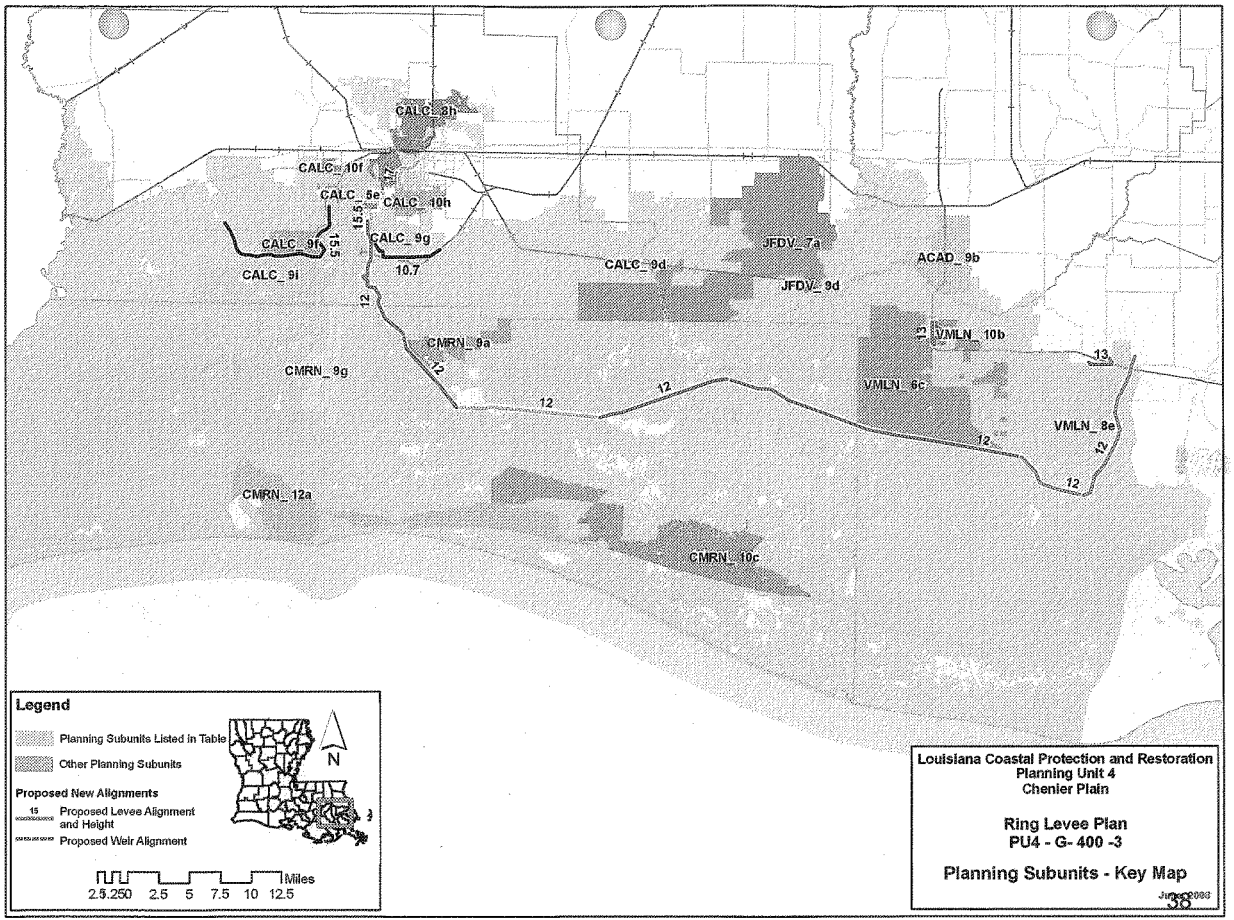
2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 4
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		Structural Plan
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	GIWW Alt
10-year	472	469	725	667	511	532	794	763	400-year Design
100-year	3,034	2,137	4,142	2,557	3,315	2,808	5,183	4,013	
400-year	6,592	3,645	7,874	4,112	8,001	5,660	9,283	6,166	
1,000-year	10,316	10,277	11,581	10,802	11,241	11,569	12,313	12,205	
2,000-year	12,755	12,551	13,904	12,984	13,422	13,834	14,373	14,160	

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels.

2024


Westlake
Sulphur
Lake Charles
Vinton
Jennings
Crowley
Lafayette
Gueydan
Kaplan
Abbeville
Calcasieu Lake
Grand Lake
White Lake
Vermilion Bay
Cameron
Legend
Primary Roads
Planning Unit Boundary
New Levees & Existing Levee Modifications
New 12' Foot Levee
N
Miles
4 2 0 4 8 12 16 20
Louisiana Coastal Protection and Restoration
Planning Unit 4
Chenier Plain
GIWW Plan (12-ft Levee)
PU4 - G - 400 - 3
(400 - Year Design Level)
May 2002

2025


CALC_8h
CALC_10f
CALC_5e
CALC_10h
CALC_9f
CALC_9g
CALC_9i
CALC_9d
JFDV_7a
JFDV_9d
ACAD_9b
VMLN_10b
VMLN_6c
VMLN_8e
CMRN_9a
CMRN_9g
CMRN_12a
CMRN_10c
15.5
10.7
12
13
Legend
Planning Subunits Listed in Table
Other Planning Subunits
Proposed New Alignments
Proposed Levee Alignment and Height
Proposed Weir Alignment
N
Miles
2.5 0 2.5 5 7.5 10 12.5
Louisiana Coastal Protection and Restoration
Planning Unit 4
Chenier Plain
Ring Levee Plan
PU4 - G- 400 -3
Planning Subunits - Key Map

2026

Alternative: PU4-G-400-3

Water Surface Elevations (feet - NAVD88 2004.65)

Planning Sub Unit	2010 (Base) Conditions						2060 (Future) Conditions					
	100-yr Event		400-year Event		1,000-yr Event		100-yr Event		400-year Event		1,000-yr Event	
	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project
ACAD_9b	7.8	3.7	9.4	7.6	12.2	12.0	10.4	3.7	12.0	7.6	14.8	12.0
CALC_10f	6.0	6.0	8.1	8.1	9.7	9.7	8.6	8.6	10.7	10.7	12.3	12.3
CALC_10h	5.5	10.1	6.1	10.4	9.1	14.9	8.1	10.1	8.7	10.4	11.7	14.9
CALC_5e	7.8	8.0	8.5	8.7	12.1	16.9	10.4	8.0	11.1	8.7	14.7	16.9
CALC_8h	7.8	7.8	10.7	10.7	12.8	12.8	10.4	10.4	13.3	13.3	15.4	15.4
CALC_9d	7.8	3.1	9.7	8.5	13.6	12.0	10.4	3.1	12.3	8.5	16.2	12.0
CALC_9f	8.8	7.2	13.6	7.2	16.0	15.2	11.4	7.2	16.2	7.2	18.6	15.2
CALC_9g	10.9	8.1	14.6	8.1	17.1	15.5	13.5	8.1	17.2	8.1	19.7	15.5
CALC_9i	8.4	8.4	12.8	12.8	15.3	15.3	11.0	11.0	15.4	15.4	17.9	17.9
CMRN_10c	11.1	11.8	14.8	15.5	16.8	17.5	13.8	14.4	17.1	18.1	18.8	20.1
CMRN_12a	13.0	14.4	16.9	18.3	19.0	20.4	15.3	17.0	18.9	20.9	20.7	23.0
CMRN_9a	9.5	3.1	14.1	8.5	16.3	12.0	12.1	3.1	16.7	8.5	18.9	12.0
CMRN_9g	9.6	10.8	13.1	15.0	15.2	17.2	12.7	13.4	16.4	17.6	18.6	19.8
JFDV_7a	7.5	3.1	11.9	8.5	14.7	12.0	10.1	3.1	14.5	8.5	17.3	12.0
JFDV_9d	6.4	3.7	11.1	7.6	13.5	12.0	9.0	3.7	13.7	7.6	16.1	12.0
VMLN_10b	7.8	5.7	11.2	6.7	13.5	15.5	10.4	5.7	13.8	6.7	16.1	15.5
VMLN_12d	7.8	11.3	11.1	12.1	14.3	15.5	10.4	11.3	13.7	12.1	16.9	15.5
VMLN_6c	7.8	3.7	10.7	7.6	12.7	12.0	10.4	3.7	13.3	7.6	15.3	12.0
VMLN_8e	8.6	3.7	12.1	7.6	14.2	12.0	11.2	3.7	14.7	7.6	16.8	12.0

Evaluation Parameters				
	Confidence Level:	90%	Levee Design:	No Friction Waves
	Future Relative Sea Level Rise:	2.6 feet	Levee Overtopping:	No Friction Waves

2027

Planning Unit:	4	Alt. No.:	PU 1000-3	Category:	Coastal Restoration + Structural Measures
Alternative Description:	Sustain coastal landscape through restoration. Construct a 12-foot continuous levee (with gates) along the GIWW plus a ring levee to the west of the Calcasieu River and a series of levees within Lake Charles to separate the river from the land. Includes				
Coastal Component:	R1		Nonstructural Component:		None
Structural Component:	See alternative description above.				

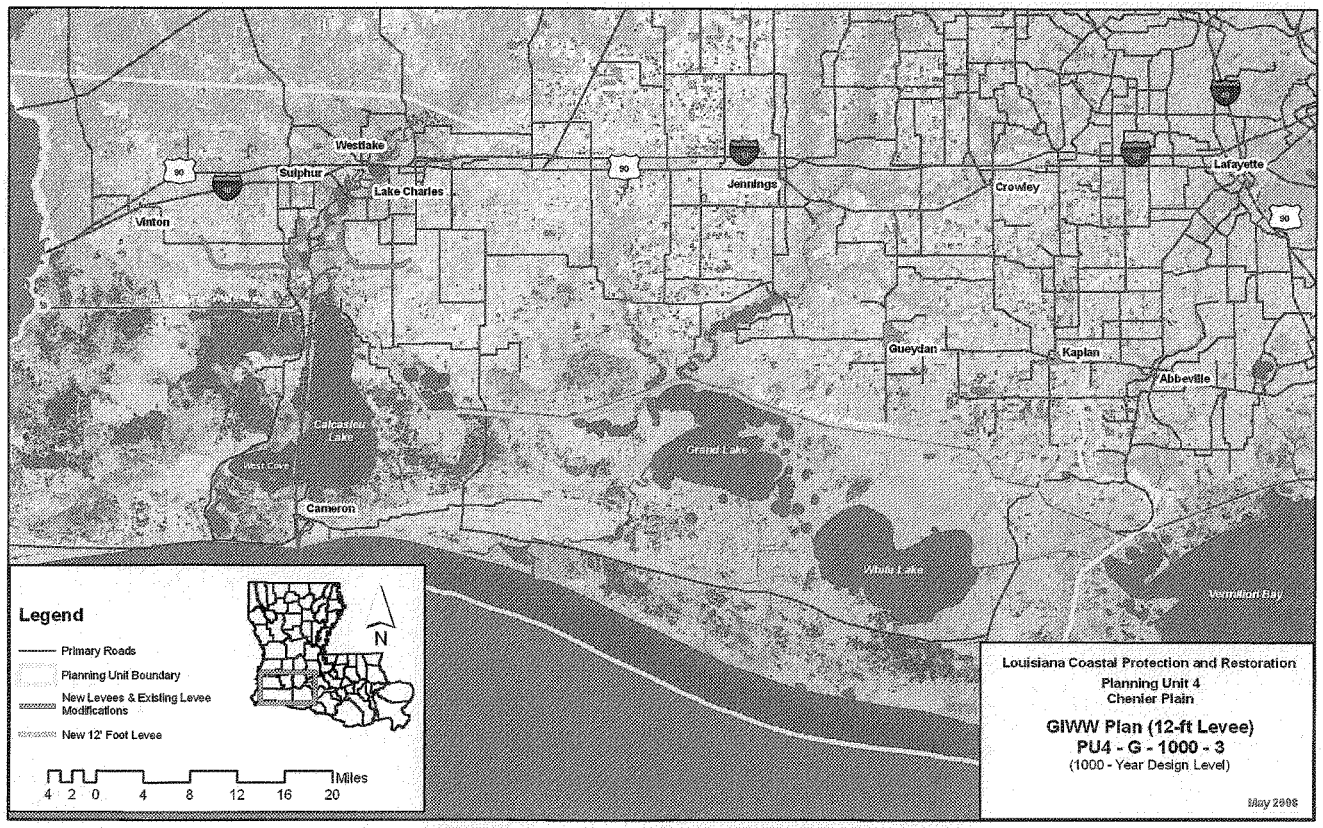
Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	1,174	2,575	215	246	712	45	139	1	0
		Mid		3,193	261	273	795	48	115	1	0
		Low		3,832	319	323	935	57	90	1	0
2	High RSLR High Employment Dispersed Population	High	1,203	2,716	226	266	740	48	139	1	0
		Mid		3,278	276	329	866	56	115	1	0
		Low		3,975	338	399	986	63	90	1	0
3	Low RSLR Business-as-Usual Compact Population	High	1,174	2,454	225	258	741	47	139	1	0
		Mid		3,030	280	285	818	50	115	1	0
		Low		3,620	355	322	934	57	90	1	0
4	High RSLR Business-as-Usual Compact Population	High	1,203	2,574	239	287	781	51	139	1	0
		Mid		3,132	306	329	878	57	115	1	0
		Low		3,759	392	386	980	63	90	1	0

Other Results		Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Construction Time (years)	10	After 50 yrs (% of baseline)	103	101	103	101
Direct Wetland Impacts (acres)	2,500	After 100 yrs (% of baseline)	106	100	106	100
Indirect Impacts (unitless)	-6	Present Value of Life Cycle Costs ($ Millions)				
Spatial Integrity (unitless)	0.44	Coastal Component	10,783	11,077	10,783	11,077
Non-Federal Share of Present Value of Life Cycle Costs	Scenario ($ Millions)	Nonstructural Component	0	0	0	0
1 / 2	8,151 8,353	Structural Component	12,205	12,488	12,205	12,488
3 / 4	8,151 8,353	Total Project	22,989	23,566	22,989	23,566

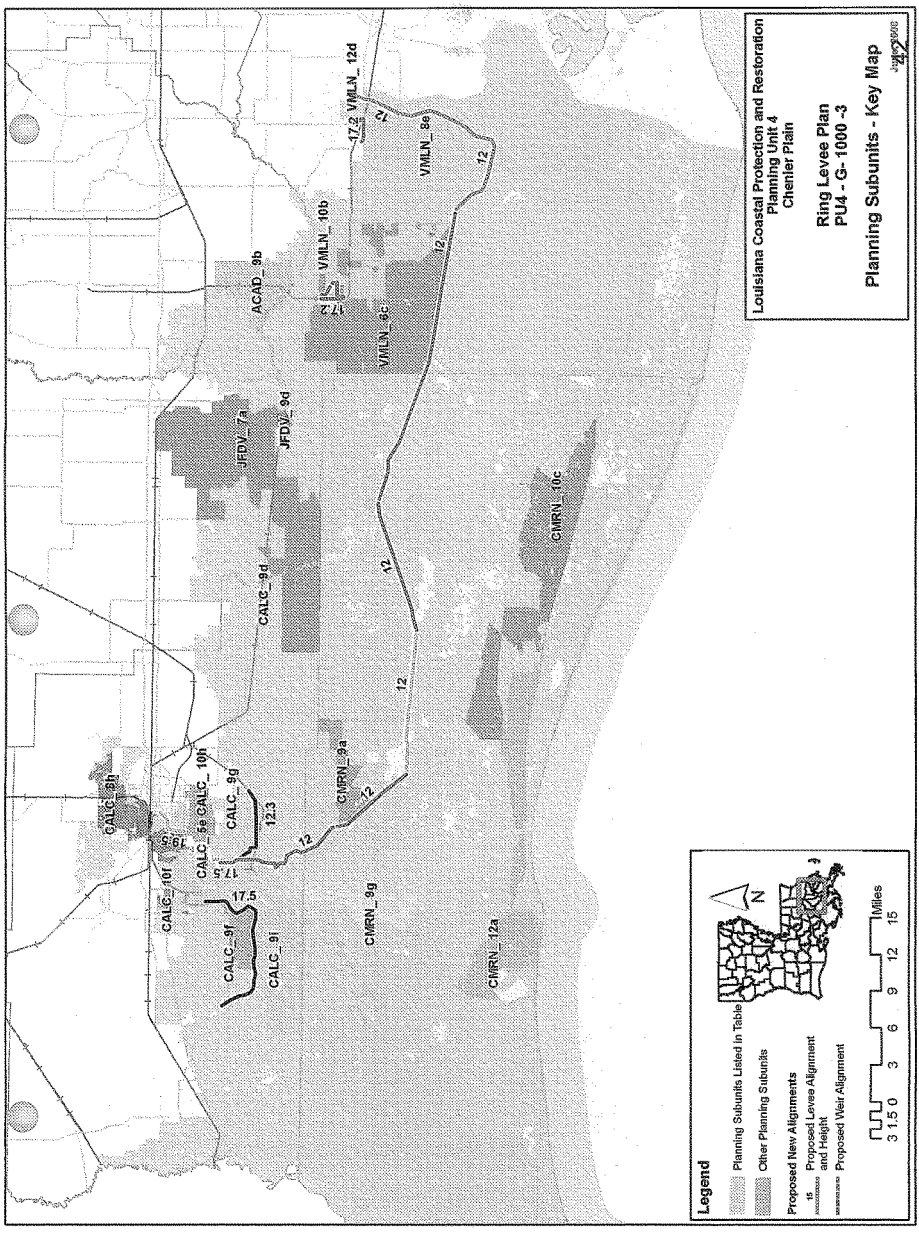
2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 4
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		Structural Plan
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	GIWW Alt
10-year	472	469	725	667	511	532	794	763	1000-year Design
100-year	3,034	2,137	4,142	2,557	3,315	2,808	5,183	4,013	
400-year	6,592	3,628	7,874	4,095	8,001	5,642	9,283	6,147	
1,000-year	10,316	6,998	11,581	7,523	11,241	8,534	12,313	9,170	
2,000-year	12,755	9,115	13,904	9,548	13,422	10,747	14,373	11,073	

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels.

2028


Westlake
Sulphur
Lake Charles
Vinton
Jennings
Crowley
Lafayette
Gueydan
Kaplan
Abbeville
Calcasieu Lake
West Cove
Grand Lake
Cameron
Vermilion Bay
Legend
Primary Roads
Planning Unit Boundary
New Levees & Existing Levee Modifications
New 12' Foot Levee
N
Miles
4 2 0 4 8 12 16 20
Louisiana Coastal Protection and Restoration
Planning Unit 4
Chenier Plain
GIWW Plan (12-ft Levee)
PU4 - G - 1000 - 3
(1000 - Year Design Level)
May 2008

2029


Louisiana Coastal Protection and Restoration
Planning Unit 4
Chenier Plain
Ring Levee Plan
PU4 - G- 1000 -3
Planning Subunits - Key Map
Legend
Planning Subunits Listed in Table
Other Planning Subunits
Proposed New Alignments
15 Proposed Levee Alignment and Height
Proposed Weir Alignment
Miles
0 3 6 9 12 15
N
CALC_8h
CALC_10f
CALC_9f
CALC_9i
CALC_5a
CALC_10i
CALC_9g
CALC_9d
JFDV_7a
JFDV_9d
ACAD_9b
VMLN_10b
VMLN_9c
VMLN_12d
VMLN_8a
CMRN_9a
CMRN_9g
CMRN_12a
CMRN_10c
17.5
12.3
12
17.2

Alternative: PU4-G-1000-3

Water Surface Elevations (feet - NAVD88 2004.65)

Planning Sub Unit	2010 (Base) Conditions						2060 (Future) Conditions					
	100-yr Event		400-year Event		1,000-yr Event		100-yr Event		400-year Event		1,000-yr Event	
	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project
ACAD_9b	7.8	3.7	9.4	7.6	12.2	12.0	10.4	3.7	12.0	7.6	14.8	12.0
CALC_10f	6.0	6.0	8.1	8.1	9.7	9.7	8.6	8.6	10.7	10.7	12.3	12.3
CALC_10h	5.5	10.1	6.1	10.1	9.1	10.3	8.1	10.1	8.7	10.1	11.7	10.3
CALC_5e	7.8	8.0	8.5	8.0	12.1	8.4	10.4	8.0	11.1	8.0	14.7	8.4
CALC_8h	7.8	7.8	10.7	10.7	12.8	12.8	10.4	10.4	13.3	13.3	15.4	15.4
CALC_9d	7.8	3.1	9.7	8.5	13.6	12.0	10.4	3.1	12.3	8.5	16.2	12.0
CALC_9f	8.8	7.2	13.6	7.2	16.0	7.2	11.4	7.2	16.2	7.2	18.6	7.2
CALC_9g	10.9	8.1	14.6	8.1	17.1	8.1	13.5	8.1	17.2	8.1	19.7	8.1
CALC_9i	8.4	8.4	12.8	12.8	15.3	15.3	11.0	11.0	15.4	15.4	17.9	17.9
CMRN_10c	11.1	11.8	14.8	15.5	16.8	17.5	13.8	14.4	17.1	18.1	18.8	20.1
CMRN_12a	13.0	14.4	16.9	18.3	19.0	20.4	15.3	17.0	18.9	20.9	20.7	23.0
CMRN_9a	9.5	3.1	14.1	8.5	16.3	12.0	12.1	3.1	16.7	8.5	18.9	12.0
CMRN_9g	9.6	10.8	13.1	15.0	15.2	17.2	12.7	13.4	16.4	17.6	18.6	19.8
JFDV_7a	7.5	3.1	11.9	8.5	14.7	12.0	10.1	3.1	14.5	8.5	17.3	12.0
JFDV_9d	6.4	3.7	11.1	7.6	13.5	12.0	9.0	3.7	13.7	7.6	16.1	12.0
VMLN_10b	7.8	5.7	11.2	5.7	13.5	7.3	10.4	5.7	13.8	5.7	16.1	7.3
VMLN_12d	7.8	11.3	11.1	11.3	14.3	12.5	10.4	11.3	13.7	11.3	16.9	12.5
VMLN_6c	7.8	3.7	10.7	7.6	12.7	12.0	10.4	3.7	13.3	7.6	15.3	12.0
VMLN_8e	8.6	3.7	12.1	7.6	14.2	12.0	11.2	3.7	14.7	7.6	16.8	12.0

Evaluation Parameters				
	Confidence Level:	90%	Levee Design:	No Friction Waves
	Future Relative Sea Level Rise:	2.6 feet	Levee Overtopping:	No Friction Waves

2031

Planning Ur	4	Alt. No.:	PU -100-1	Category:	Coastal Restoration + Structur easures
Alternative Description:	Sustain coastal landscape through restoration. Construct ring levees to the east and west of Lake Charles; construct a series of levees within Lake Charles to separate the river from the land; and construct ring levees around Kaplan and Gueydan to the 100				
Coastal Component:	R1		Nonstructural Component:		None
Structural Component:	See alternative description above.				

Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	689	2,883	217	249	720	45	109	1	0
		Mid		3,817	277	278	821	49	85	1	0
		Low		4,704	352	335	982	60	60	0	0
2	High RSLR High Employment Dispersed Population	High	705	3,121	233	268	745	48	109	1	0
		Mid		3,985	300	341	911	59	85	0	0
		Low		4,972	381	412	1,037	66	60	0	0
3	Low RSLR Business-as-Usual Compact Population	High	689	2,721	226	262	752	48	109	1	0
		Mid		3,576	292	291	848	52	85	1	0
		Low		4,358	376	336	1,002	61	60	0	0
4	High RSLR Business-as-Usual Compact Population	High	705	2,924	244	289	789	52	109	1	0
		Mid		3,748	317	342	927	60	85	0	0
		Low		4,607	424	401	1,050	67	60	0	0

Other Results			Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Construction Time (years)		10	After 50 yrs (% of baseline)	103	101	103	101
Direct Wetland Impacts (acres)		100	After 100 yrs (% of baseline)	106	100	106	100
Indirect Impacts (unitless)		0	Present Value of Life Cycle Costs ($ Millions)				
Spatial Integrity (unitless)		0.44	Coastal Component	10,783	11,077	10,783	11,077
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)	Nonstructural Component	0	0	0	0
	1 / 2	4,749	Structural Component	2,702	2,720	2,702	2,720
	3 / 4	4,749	Total Project	13,485	13,797	13,485	13,797

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)								
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4	
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj
10-year	472	504	725	752	511	585	794	843
100-year	3,034	2,666	4,142	3,524	3,315	2,871	5,183	4,570
400-year	6,592	5,958	7,874	6,826	8,001	7,614	9,283	8,523
1,000-year	10,316	8,701	11,581	9,566	11,241	9,957	12,313	10,673
2,000-year	12,755	9,937	13,904	10,733	13,422	10,962	14,373	11,663

Planning Unit 4

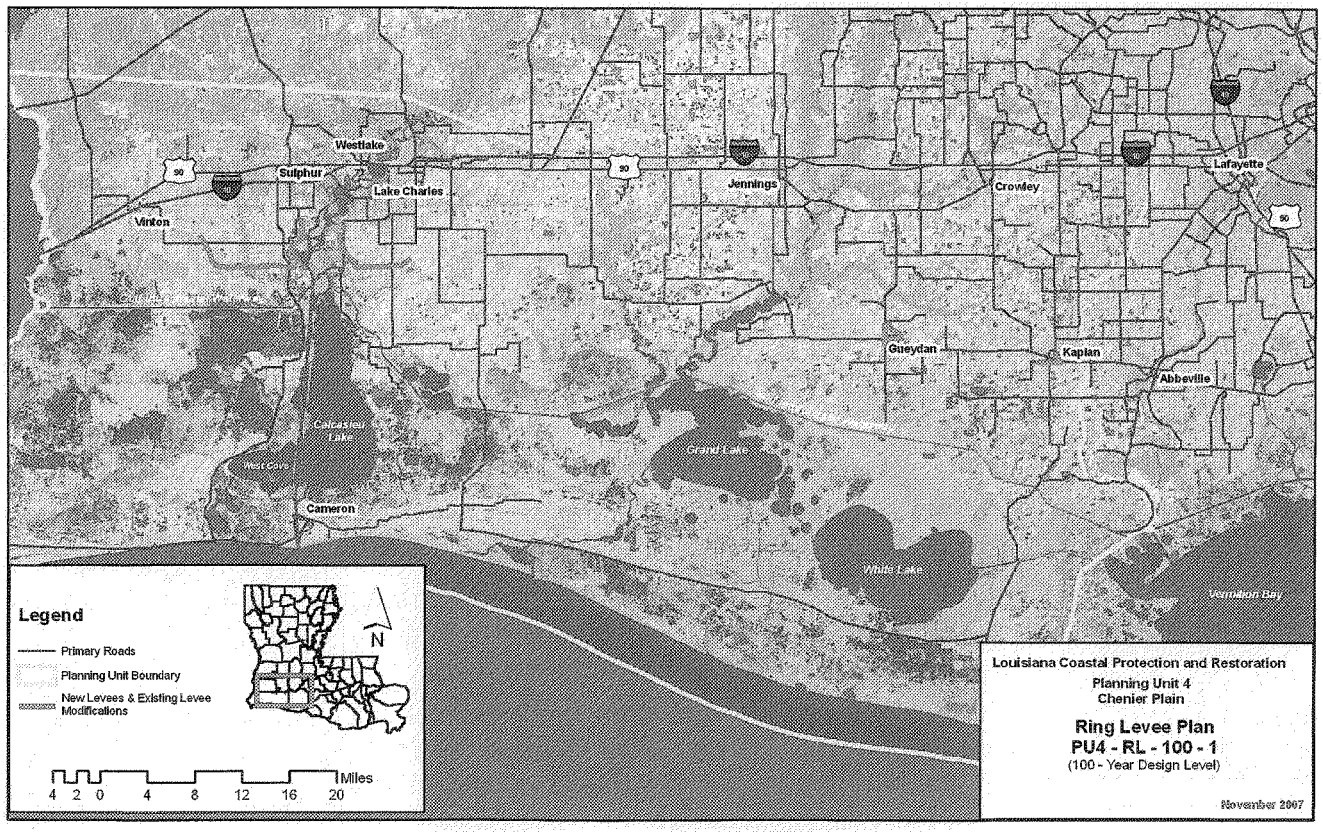
Structural Plan

Ring Levee Alt

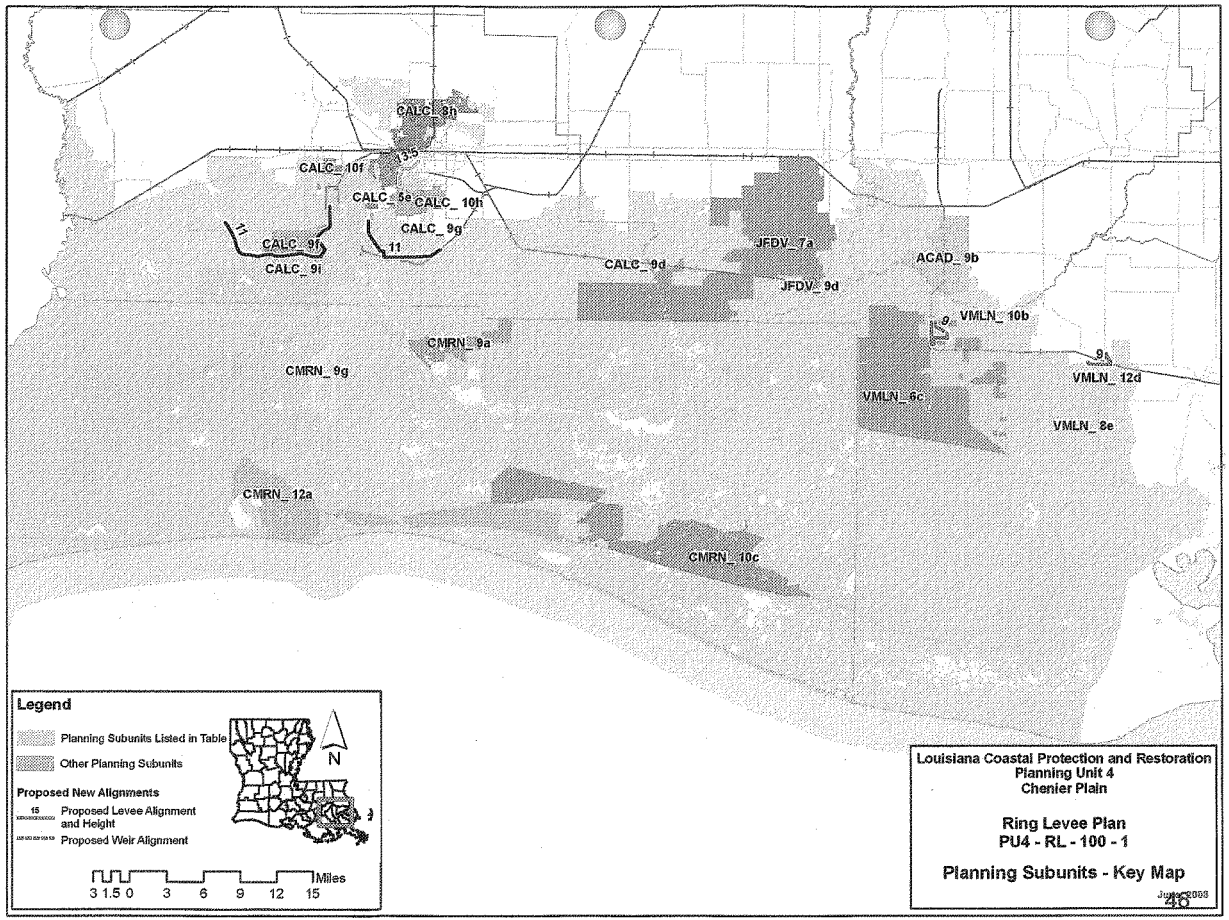
100-year Design

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels.

2032


Westlake
Sulphur
Lake Charles
Vinton
Jennings
Crowley
Lafayette
Grueydan
Kaplan
Abbeville
Calcasieu Lake
West Cove
Cameron
Grand Lake
White Lake
Vermilion Bay
Legend
Primary Roads
Planning Unit Boundary
New Levees & Existing Levee Modifications
N
Miles
4 2 0 4 8 12 16 20
Louisiana Coastal Protection and Restoration
Planning Unit 4
Chenier Plain
Ring Levee Plan
PU4 - RL - 100 - 1
(100 - Year Design Level)
November 2007

2033


CALC_8h
CALC_10f
CALC_5e
CALC_10h
CALC_9g
CALC_9f
CALC_9i
CALC_9d
JFDV_7a
JFDV_9d
ACAD_9b
VMLN_10b
VMLN_12d
VMLN_6c
VMLN_8e
CMRN_9a
CMRN_9g
CMRN_12a
CMRN_10c
Legend
Planning Subunits Listed in Table
Other Planning Subunits
Proposed New Alignments
Proposed Levee Alignment and Height
Proposed Weir Alignment
N
3 1.5 0 3 6 9 12 15 Miles
Louisiana Coastal Protection and Restoration
Planning Unit 4
Chenier Plain
Ring Levee Plan
PU4 - RL - 100 - 1
Planning Subunits - Key Map
June 2008

2034

Alternative: PU4-RL-100-1

Water Surface Elevations (feet - NAVD88 2004.65)

Planning Sub Unit	2010 (Base) Conditions						2060 (Future) Conditions					
	100-yr Event		400-year Event		1,000-yr Event		100-yr Event		400-year Event		1,000-yr Event	
	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project
ACAD_9b	7.8	7.8	9.4	9.4	12.2	12.2	10.4	10.4	12.0	12.0	14.8	14.8
CALC_10f	6.0	6.0	8.1	8.1	9.7	9.7	8.6	8.6	10.7	10.7	12.3	12.3
CALC_10h	5.5	10.2	6.1	13.5	9.1	13.5	8.1	10.2	8.7	13.5	11.7	13.5
CALC_5e	7.8	8.3	8.5	13.5	12.1	13.5	10.4	8.3	11.1	13.5	14.7	13.5
CALC_8h	7.8	7.8	10.7	10.7	12.8	12.8	10.4	10.4	13.3	13.3	15.4	15.4
CALC_9d	7.8	7.8	9.7	9.7	13.6	13.6	10.4	10.4	12.3	12.3	16.2	16.2
CALC_9f	8.8	7.2	13.6	11.0	16.0	11.0	11.4	7.2	16.2	11.0	18.6	11.0
CALC_9g	10.9	8.1	14.6	11.0	17.1	11.0	13.5	8.1	17.2	11.0	19.7	11.0
CALC_9i	8.4	8.4	12.8	12.8	15.3	15.3	11.0	11.0	15.4	15.4	17.9	17.9
CMRN_10c	11.1	11.1	14.8	14.8	16.8	16.8	13.8	13.7	17.1	17.4	18.8	19.4
CMRN_12a	13.0	13.0	16.9	16.9	19.0	19.0	15.3	15.6	18.9	19.5	20.7	21.6
CMRN_9a	9.5	9.5	14.1	14.1	16.3	16.3	12.1	12.1	16.7	16.7	18.9	18.9
CMRN_9g	9.6	9.6	13.1	13.1	15.2	15.2	12.7	12.2	16.4	15.7	18.6	17.8
JFDV_7a	7.5	7.5	11.9	11.9	14.7	14.7	10.1	10.1	14.5	14.5	17.3	17.3
JFDV_9d	6.4	6.4	11.1	11.1	13.5	13.5	9.0	9.0	13.7	13.7	16.1	16.1
VMLN_10b	7.8	6.2	11.2	9.0	13.5	9.0	10.4	6.2	13.8	9.0	16.1	9.0
VMLN_12d	7.8	7.8	11.1	11.1	14.3	14.3	10.4	10.4	13.7	13.7	16.9	16.9
VMLN_6c	7.8	7.8	10.7	10.7	12.7	12.7	10.4	10.4	13.3	13.3	15.3	15.3
VMLN_8e	8.6	8.6	12.1	12.1	14.2	14.2	11.2	11.2	14.7	14.7	16.8	16.8

Evaluation Parameters				
	Confidence Level:	90%	Levee Design:	No Friction Waves
	Future Relative Sea Level Rise:	2.6 feet	Levee Overtopping:	No Friction Waves

2035

Planning Unit:	4	Alt. No.:	PU 4-400-1	Category:	Coastal Restoration + Structural Measures
Alternative Description:	Sustain coastal landscape through restoration. Construct ring levees to the east and west of Lake Charles; construct a series of levees within Lake Charles to separate the river from the land; and construct ring levees around Kaplan and Gueydan to the 400				
Coastal Component:	R1	Nonstructural Component:	None		
Structural Component:	See alternative description above.				

Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	728	2,843	216	247	716	45	109	1	0
		Mid		3,705	274	275	806	49	85	1	0
		Low		4,590	352	335	978	60	60	1	0
2	High RSLR High Employment Dispersed Population	High	744	3,079	231	266	740	47	109	1	0
		Mid		3,871	296	337	896	58	85	1	0
		Low		4,862	380	410	1,033	66	60	0	0
3	Low RSLR Business-as-Usual Compact Population	High	728	2,687	224	259	744	47	109	1	0
		Mid		3,483	288	286	829	51	85	1	0
		Low		4,257	374	334	993	61	60	1	0
4	High RSLR Business-as-Usual Compact Population	High	744	2,888	242	285	780	51	109	1	0
		Mid		3,652	313	337	908	59	85	1	0
		Low		4,505	422	398	1,041	66	60	0	0

Other Results	
Construction Time (years)	12
Direct Wetland Impacts (acres)	100
Indirect Impacts (unitless)	0
Spatial Integrity (unitless)	0.44

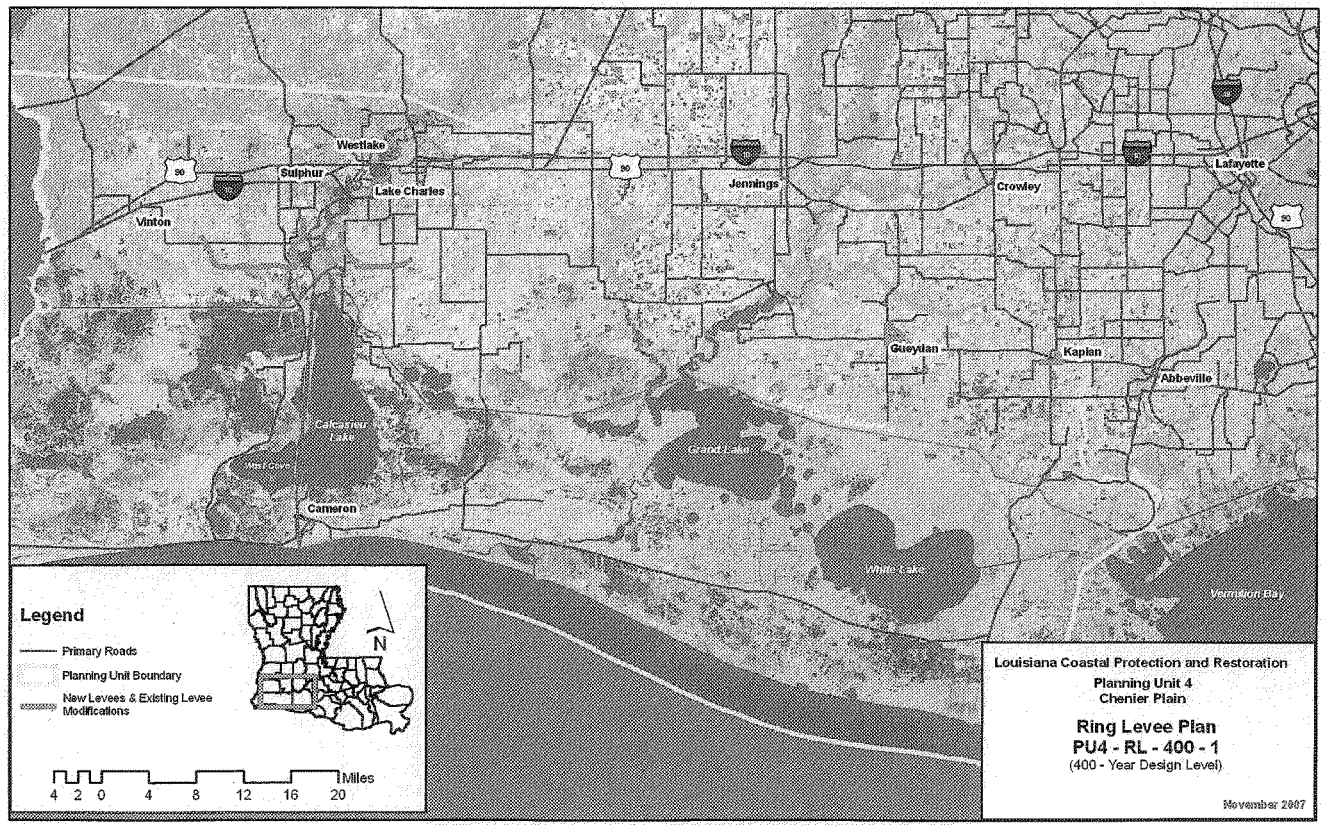
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)	
	1 / 2	5,054	5,165
	3 / 4	5,054	5,165

Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
After 50 yrs (% of baseline)	103	101	103	101
After 100 yrs (% of baseline)	106	100	106	100
Present Value of Life Cycle Costs ($ Millions)				
Coastal Component	10,783	11,077	10,783	11,077
Nonstructural Component	0	0	0	0
Structural Component	3,471	3,494	3,471	3,494
Total Project	14,254	14,571	14,254	14,571

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 4
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	Structural Plan
10-year	472	504	725	752	511	566	794	844	Ring Levee Alt
100-year	3,034	2,661	4,142	3,519	3,315	2,865	5,183	4,564	
400-year	6,592	5,007	7,874	5,860	8,001	6,592	9,283	7,485	400-year Design
1,000-year	10,316	11,014	11,581	11,876	11,241	11,954	12,313	12,666	
2,000-year	12,755	13,725	13,904	14,521	13,422	14,329	14,373	15,029	

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels.

2036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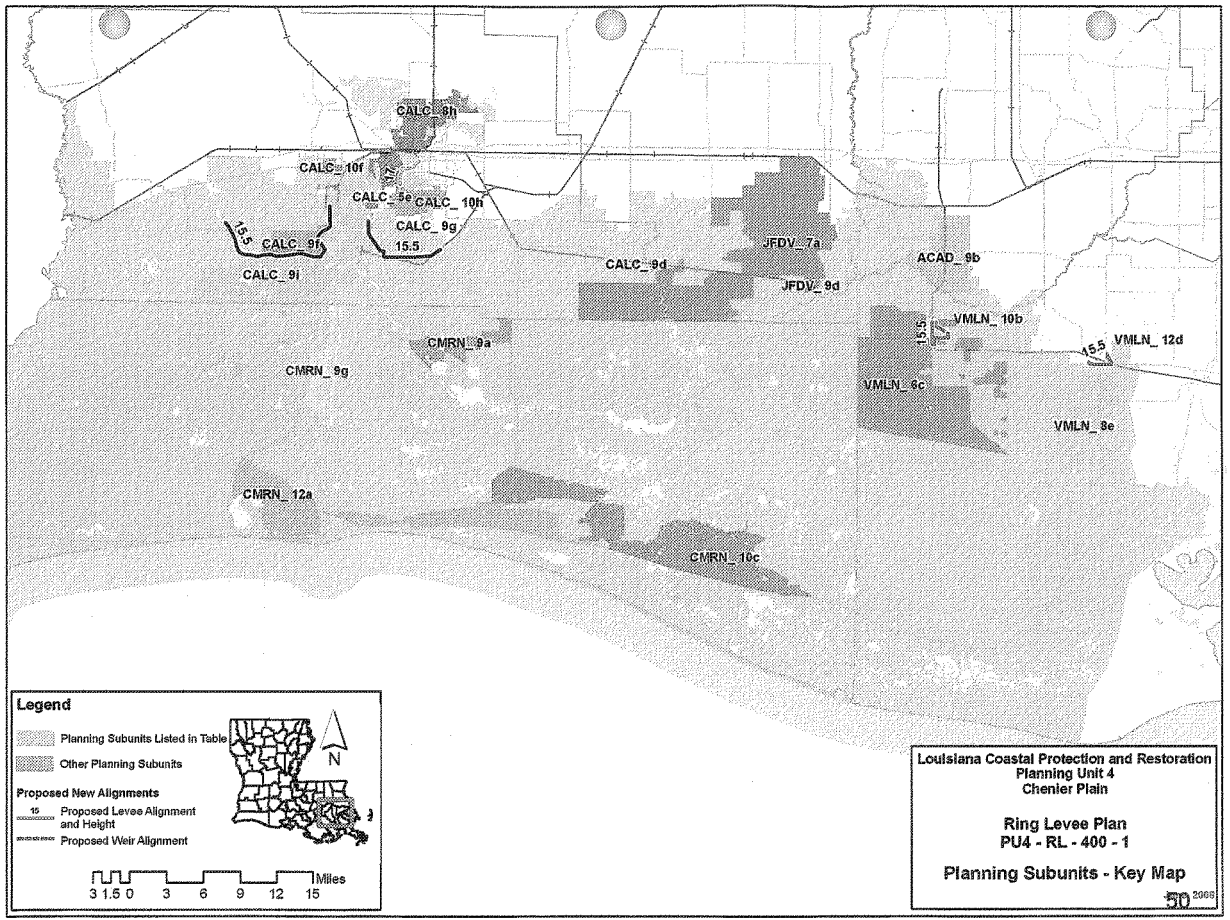
Lake Charles
Vinton
Jennings
Crowley
Lafayette
Gueydan
Kaplan
Abbeville
Cameron
Calcasieu Lake
Grand Lake
White Lake
Vermilion Bay
Legend
Primary Roads
Planning Unit Boundary
New Levees & Existing Levee Modifications
N
Miles
4 2 0 4 8 12 16 20
Louisiana Coastal Protection and Restoration
Planning Unit 4
Chenier Plain
Ring Levee Plan
PU4 - RL - 400 - 1
(400 - Year Design Level)
November 2007

2037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17
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15.5
CALC_ 9f
CALC_ 9i
CALC_ 9d
JFDV_ 7a
JFDV_ 9d
ACAD_ 9b
VMLN_ 10b
15.5
15.5
VMLN_ 12d
CMRN_ 9a
CMRN_ 9g
VMLN_ 9c
VMLN_ 8e
CMRN_ 12a
CMRN_ 10c
Legend
Planning Subunits Listed in Table
Other Planning Subunits
Proposed New Alignments
15
Proposed Levee Alignment and Height
Proposed Weir Alignment
N
3 1.5 0 3 6 9 12 15
Miles
Louisiana Coastal Protection and Restoration
Planning Unit 4
Chenier Plain
Ring Levee Plan
PU4 - RL - 400 - 1
Planning Subunits - Key Map
50 2008

Alternative: PU4-RL-400-1

Water Surface Elevations (feet - NAVD88 2004.65)

Planning Sub Unit	2010 (Base) Conditions						2060 (Future) Conditions					
	100-yr Event		400-year Event		1,000-yr Event		100-yr Event		400-year Event		1,000-yr Event	
	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project
ACAD_9b	7.8	7.8	9.4	9.4	12.2	12.2	10.4	10.4	12.0	12.0	14.8	14.8
CALC_10f	6.0	6.0	8.1	8.1	9.7	9.7	8.6	8.6	10.7	10.7	12.3	12.3
CALC_10h	5.5	10.1	6.1	10.4	9.1	14.9	8.1	10.1	8.7	10.4	11.7	14.9
CALC_5e	7.8	8.0	8.5	8.7	12.1	16.9	10.4	8.0	11.1	8.7	14.7	16.9
CALC_8h	7.8	7.8	10.7	10.7	12.8	12.8	10.4	10.4	13.3	13.3	15.4	15.4
CALC_9d	7.8	7.8	9.7	9.7	13.6	13.6	10.4	10.4	12.3	12.3	16.2	16.2
CALC_9f	8.8	7.2	13.6	7.2	16.0	15.2	11.4	7.2	16.2	7.2	18.6	15.2
CALC_9g	10.9	8.1	14.6	8.1	17.1	15.5	13.5	8.1	17.2	8.1	19.7	15.5
CALC_9i	8.4	8.4	12.8	12.8	15.3	15.3	11.0	11.0	15.4	15.4	17.9	17.9
CMRN_10c	11.1	11.1	14.8	0.0	16.8	16.8	13.8	13.7	17.1	17.4	18.8	19.4
CMRN_12a	13.0	13.0	16.9	16.9	19.0	19.0	15.3	15.6	18.9	19.5	20.7	21.6
CMRN_9a	9.5	9.5	14.1	14.1	16.3	16.3	12.1	12.1	16.7	16.7	18.9	18.9
CMRN_9g	9.6	9.6	13.1	13.1	15.2	15.2	12.7	12.2	16.4	15.7	18.6	17.8
JFDV_7a	7.5	7.5	11.9	11.9	14.7	14.7	10.1	10.1	14.5	14.5	17.3	17.3
JFDV_9d	6.4	6.4	11.1	11.1	13.5	13.5	9.0	9.0	13.7	13.7	16.1	16.1
VMLN_10b	7.8	5.7	11.2	6.7	13.5	15.5	10.4	5.7	13.8	6.7	16.1	15.5
VMLN_12d	7.8	11.3	11.1	12.1	14.3	15.5	10.4	11.3	13.7	12.1	16.9	15.5
VMLN_6c	7.8	7.8	10.7	10.7	12.7	12.7	10.4	10.4	13.3	13.3	15.3	15.3
VMLN_8e	8.6	8.6	12.1	12.1	14.2	14.2	11.2	11.2	14.7	14.7	16.8	16.8

Evaluation Parameters				
	Confidence Level:	90%	Levee Design:	No Friction Waves
	Future Relative Sea Level Rise:	2.6 feet	Levee Overtopping:	No Friction Waves

2039

Planning Ur	4	Alt. No.:	PU4 -1000-1	Category:	Coastal Restoration + Structura[illegible]easures
Alternative Description:	Sustain coastal landscape through resto[illegible]ration. Construct ring levees to the east and west of Lake Charles; construct a series of levees within Lake Charles to separate the river from the land; and construct ring levees around Kaplan and Gueydan to 1000-ye				
Coastal Component:	R1		Nonstructural Component:		None
Structural Component:	See alternative description above.				

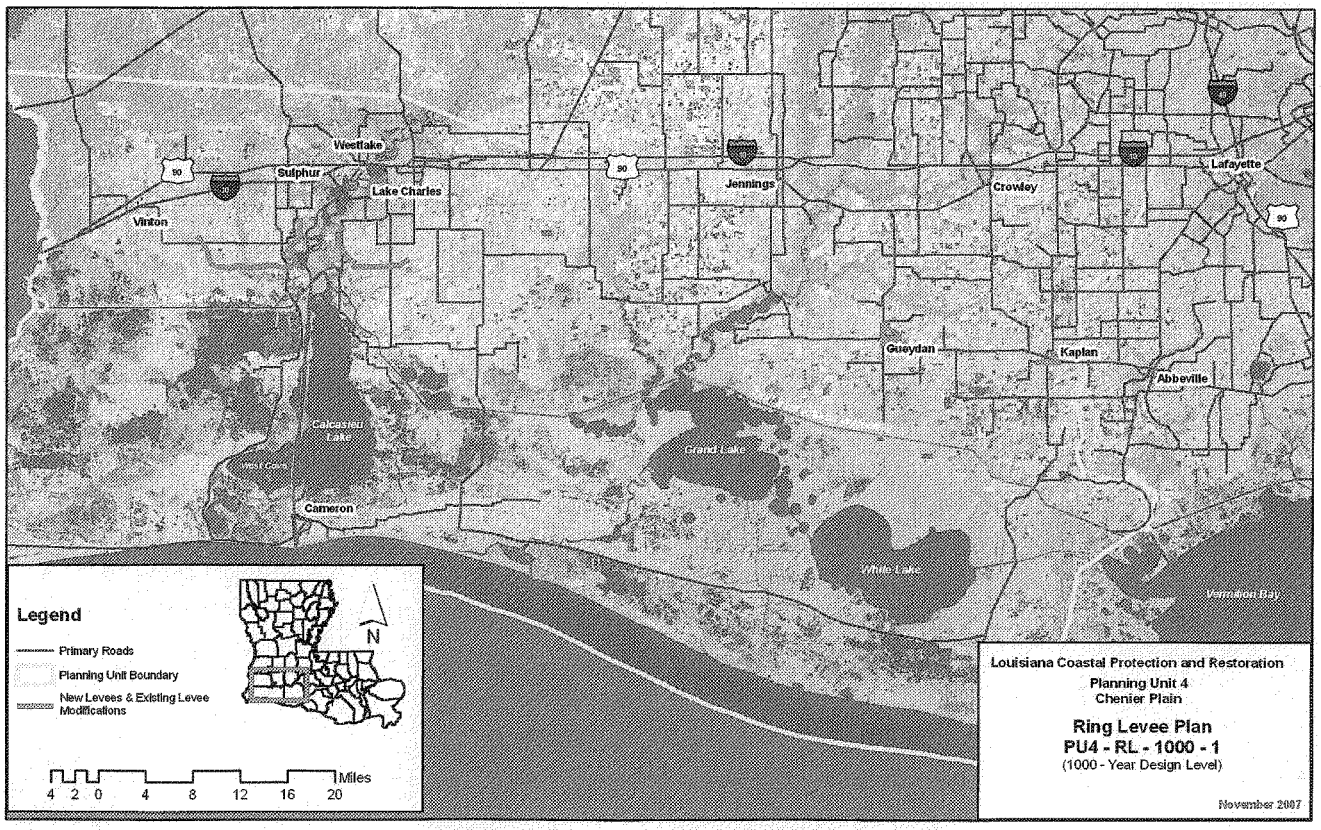
Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	742	2,814	216	246	713	45	109	1	0
		Mid		3,696	274	274	805	48	85	1	0
		Low		4,539	349	330	958	59	60	1	0
2	High RSLR High Employment Dispersed Population	High	760	3,051	231	264	738	47	109	1	0
		Mid		3,862	297	336	894	58	85	1	0
		Low		4,817	378	405	1,013	65	60	1	0
3	Low RSLR Business-as-Usual Compact Population	High	742	2,663	223	257	740	47	109	1	0
		Mid		3,477	288	285	826	51	85	1	0
		Low		4,213	371	330	972	60	60	1	0
4	High RSLR Business-as-Usual Compact Population	High	760	2,865	241	284	776	51	109	1	0
		Mid		3,464	313	336	908	59	85	1	0
		Low		4,464	419	393	1,020	65	60	1	0

Other Results			Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Construction Time (years)		14	After 50 yrs (% of baseline)	103	101	103	101
Direct Wetland Impacts (acres)		100	After 100 yrs (% of baseline)	106	100	106	100
Indirect Impacts (unitless)		0	Present Value of Life Cycle Costs ($ Millions)				
Spatial Integrity (unitless)		0.44	Coastal Component	10,783	11,077	10,783	11,077
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)	Nonstructural Component	0	0	0	0
	1 / 2	5,120	Structural Component	3,756	3,799	3,756	3,799
	3 / 4	5,120	Total Project	14,540	14,876	14,540	14,876

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 4
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		Structural Plan
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	Ring Levee Alt
10-year	472	504	725	752	511	566	794	844	1000-year Design
100-year	3,034	2,661	4,142	3,519	3,315	2,865	5,183	4,564	
400-year	6,592	4,990	7,874	5,843	8,001	6,573	9,283	7,466	
1,000-year	10,316	7,735	11,581	8,597	11,241	8,919	12,313	9,631	
2,000-year	12,755	10,289	13,904	11,084	13,422	11,242	14,373	11,942	

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels.

2040


Westlake
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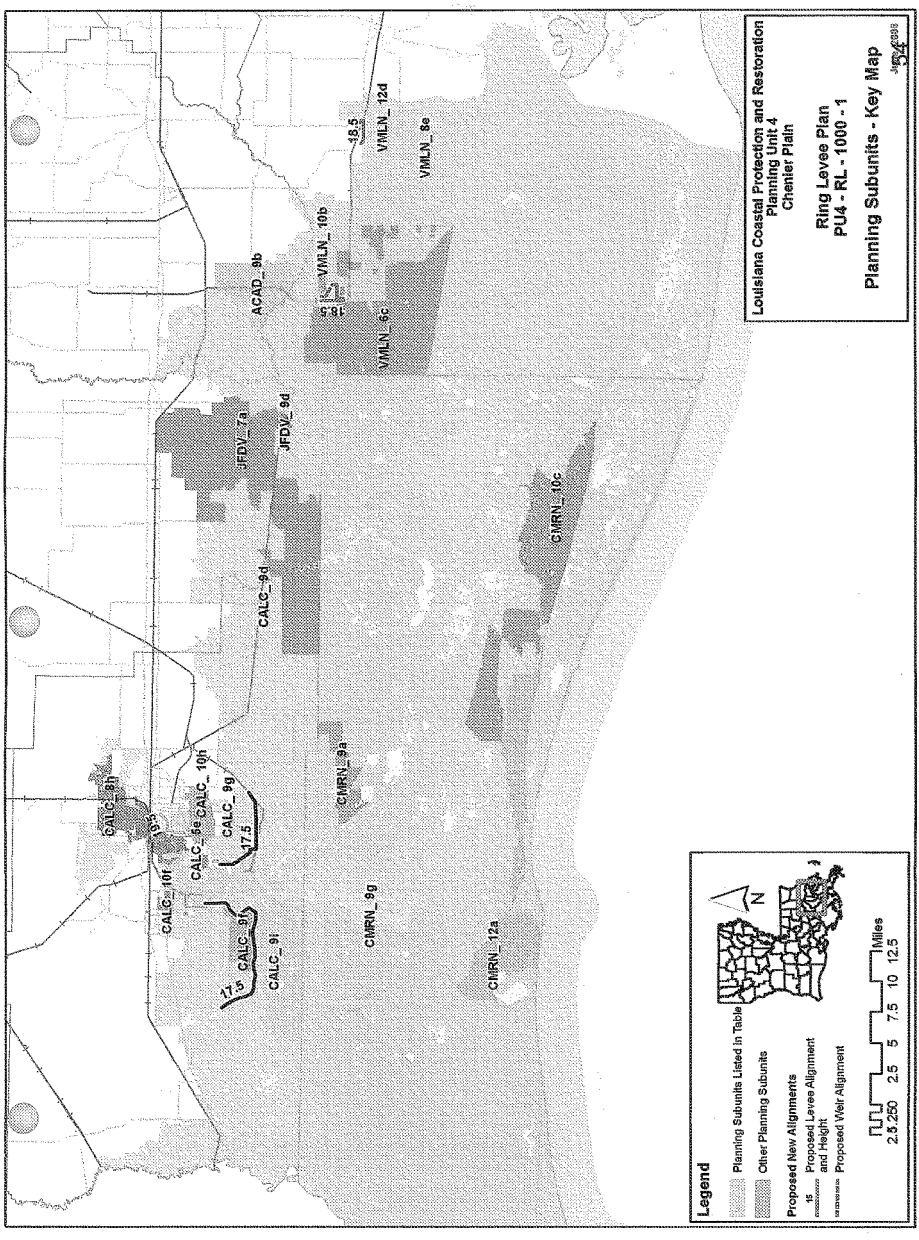
Abbeville
Calcasieu Lake
Grand Lake
Cameron
White Lake
Vermilion Bay
Legend
Primary Roads
Planning Unit Boundary
New Levees & Existing Levee Modifications
N
Miles
4 2 0 4 8 12 16 20
Louisiana Coastal Protection and Restoration
Planning Unit 4
Chenier Plain
Ring Levee Plan
PU4 - RL - 1000 - 1
(1000 - Year Design Level)
November 2007

2041


Louisiana Coastal Protection and Restoration
Planning Unit 4
Chenier Plain
Ring Levee Plan
PU4 - RL - 1000 - 1
Planning Subunits - Key Map
Legend
Planning Subunits Listed in Table
Other Planning Subunits
Proposed New Alignments
15 Proposed Levee Alignment and Height
Proposed Weir Alignment
Miles
2.5 2.5 5 7.5 10 12.5
N
CALC_8h
CALC_10f
CALC_8e
CALC_10f
CALC_9g
17.5
CALC_9i
17.5
CALC_9i
CMRN_9a
CMRN_9g
CMRN_12a
CALC_9d
JFDV_7a
JFDV_9d
ACAD_9b
VMLN_10b
VMLN_6c
18.5
VMLN_12d
VMLN_8e
CMRN_10c

Alternative: PU4-RL-1000-1

Water Surface Elevations (feet - NAVD88 2004.65)

Planning Sub Unit	2010 (Base) Conditions						2060 (Future) Conditions					
	100-yr Event		400-year Event		1,000-yr Event		100-yr Event		400-year Event		1,000-yr Event	
	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project
ACAD_9b	7.8	7.8	9.4	9.4	12.2	12.2	10.4	10.4	12.0	12.0	14.8	14.8
CALC_10f	6.0	6.0	8.1	8.1	9.7	9.7	8.6	8.6	10.7	10.7	12.3	12.3
CALC_10h	5.5	10.1	6.1	10.1	9.1	10.3	8.1	10.1	8.7	10.1	11.7	10.3
CALC_5e	7.8	8.0	8.5	8.0	12.1	8.4	10.4	8.0	11.1	8.0	14.7	8.4
CALC_8h	7.8	7.8	10.7	10.7	12.8	12.8	10.4	10.4	13.3	13.3	15.4	15.4
CALC_9d	7.8	7.8	9.7	9.7	13.6	13.6	10.4	10.4	12.3	12.3	16.2	16.2
CALC_9f	8.8	7.2	13.6	7.2	16.0	7.2	11.4	7.2	16.2	7.2	18.6	7.2
CALC_9g	10.9	8.1	14.6	8.1	17.1	8.1	13.5	8.1	17.2	8.1	19.7	8.1
CALC_9i	8.4	8.4	12.8	12.8	15.3	15.3	11.0	11.0	15.4	15.4	17.9	17.9
CMRN_10c	11.1	11.1	14.8	14.8	16.8	16.8	13.8	13.7	17.1	17.4	18.8	19.4
CMRN_12a	13.0	13.0	16.9	16.9	19.0	19.0	15.3	15.6	18.9	19.5	20.7	21.6
CMRN_9a	9.5	9.5	14.1	14.1	16.3	16.3	12.1	12.1	16.7	16.7	18.9	18.9
CMRN_9g	9.6	9.6	13.1	13.1	15.2	15.2	12.7	12.2	16.4	15.7	18.6	17.8
JFDV_7a	7.5	7.5	11.9	11.9	14.7	14.7	10.1	10.1	14.5	14.5	17.3	17.3
JFDV_9d	6.4	6.4	11.1	11.1	13.5	13.5	9.0	9.0	13.7	13.7	16.1	16.1
VMLN_10b	7.8	5.7	11.2	5.7	13.5	7.3	10.4	5.7	13.8	5.7	16.1	7.3
VMLN_12d	7.8	11.3	11.1	11.3	14.3	12.5	10.4	11.3	13.7	11.3	16.9	12.5
VMLN_6c	7.8	7.8	10.7	10.7	12.7	12.7	10.4	10.4	13.3	13.3	15.3	15.3
VMLN_8e	8.6	8.6	12.1	12.1	14.2	14.2	11.2	11.2	14.7	14.7	16.8	16.8

Evaluation Parameters				
Confidence Level:	90%	Levee Design:	No Friction Waves	
Future Relative Sea Level Rise:	2.6 feet	Levee Overtopping:	No Friction Waves	

2043

Planning Ur.	4	Alt. No.:	PU4	3-100-1	Category:	Comprehensive (Coastal+Structura	onstructural)
Alternative Description:	Comprehensive plan--Same coastal and structural measures as Alternative PU4-G-100-1 but with complementary nonstructural measures to reduce residual risk.						
Coastal Component:	R1			Nonstructural Component:		100-yr complementary measures	
Structural Component:	Same as Alternative PU4-G-100-1						

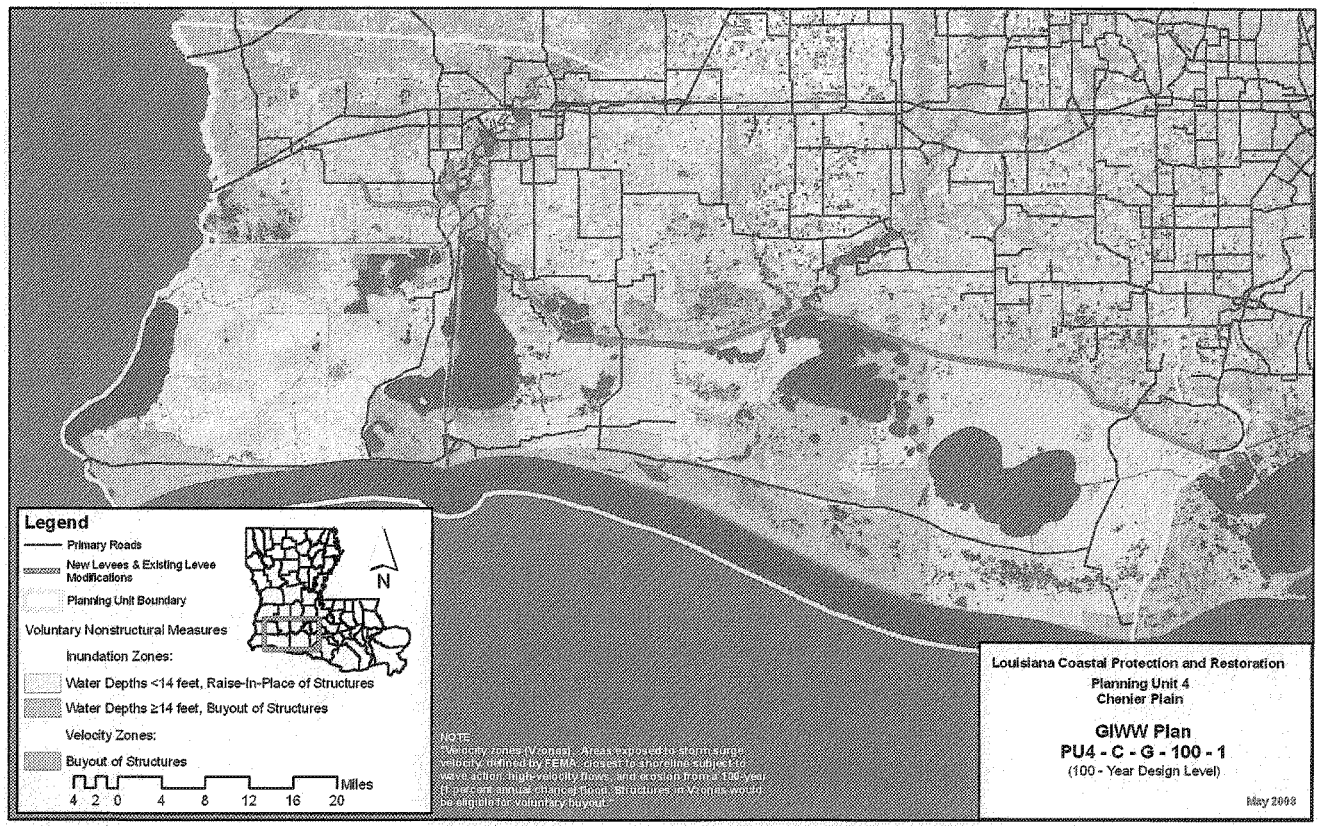
Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	1,237	1,811	98	91	267	17	140	3	0
		Mid		2,506	131	114	344	20	116	3	0
		Low		3,197	182	173	490	31	91	3	0
2	High RSLR High Employment Dispersed Population	High	1,266	1,943	104	102	279	18	140	3	0
		Mid		2,584	142	173	427	29	116	3	0
		Low		3,335	198	240	529	35	91	3	0
3	Low RSLR Business-as-Usual Compact Population	High	1,238	1,702	103	92	273	17	140	3	0
		Mid		2,339	138	114	345	21	116	3	0
		Low		2,980	196	167	496	31	91	3	0
4	High RSLR Business-as-Usual Compact Population	High	1,267	1,815	110	106	289	19	140	3	0
		Mid		2,433	152	163	426	29	116	3	0
		Low		3,116	225	218	524	34	91	3	0

Other Results			Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Construction Time (years)		10	After 50 yrs (% of baseline)	103	101	103	101
Direct Wetland Impacts (acres)		2,200	After 100 yrs (% of baseline)	106	100	106	100
Indirect Impacts (unitless)		-5	Present Value of Life Cycle Costs ($ Millions)				
Spatial Integrity (unitless)		0.44	Coastal Component	10,783	11,077	10,783	11,077
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)	Nonstructural Component	1,451	1,451	1,467	1,467
	1 / 2	8,573 8,774	Structural Component	11,989	12,272	11,989	12,272
	3 / 4	8,578 8,780	Total Project	24,224	24,801	24,239	24,816

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 4
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		Comprehensive Plan
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	GIWW Alt
10-year	472	157	725	170	511	181	794	195	100-year Design
100-year	3,034	520	4,142	996	3,315	529	5,183	1,384	
400-year	6,592	3,172	7,874	3,666	8,001	3,903	9,283	4,418	
1,000-year	10,316	7,198	11,581	7,794	11,241	7,370	12,313	7,936	
2,000-year	12,755	8,213	13,904	8,726	13,422	8,296	14,373	8,745	

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels.

2044


Legend
Primary Roads
New Levees & Existing Levee Modifications
Planning Unit Boundary
Voluntary Nonstructural Measures
Inundation Zones:
Water Depths <14 feet, Raise-In-Place of Structures
Water Depths ≥14 feet, Buyout of Structures
Velocity Zones:
Buyout of Structures
Miles
4 2 0 4 8 12 16 20
N
NOTE:
Velocity zones (V zones) - Areas protected from surge velocity defined by FEMA, closest to shoreline subject to wave action, high velocity flows, and erosion from a 100-year (1 percent annual chance) flood. Structures in V zones would be eligible for voluntary buyout.
Louisiana Coastal Protection and Restoration
Planning Unit 4
Chenier Plain
GIWW Plan
PU4 - C - G - 100 - 1
(100 - Year Design Level)
May 2008

2045

Planning Ur.	4	Alt. No.:	PU4 3-100-2	Category:	Comprehensive (Coastal+Structura onstructural)
Alternative Description:	Comprehensive plan--Same coastal and structural measures as Alternative PU4-G-100-2 but with complementary nonstructural measures to reduce residual risk.				
Coastal Component:	R1		Nonstructural Component:		100-yr complementary measures
Structural Component:	Same as Alternative PU4-G-100-2				

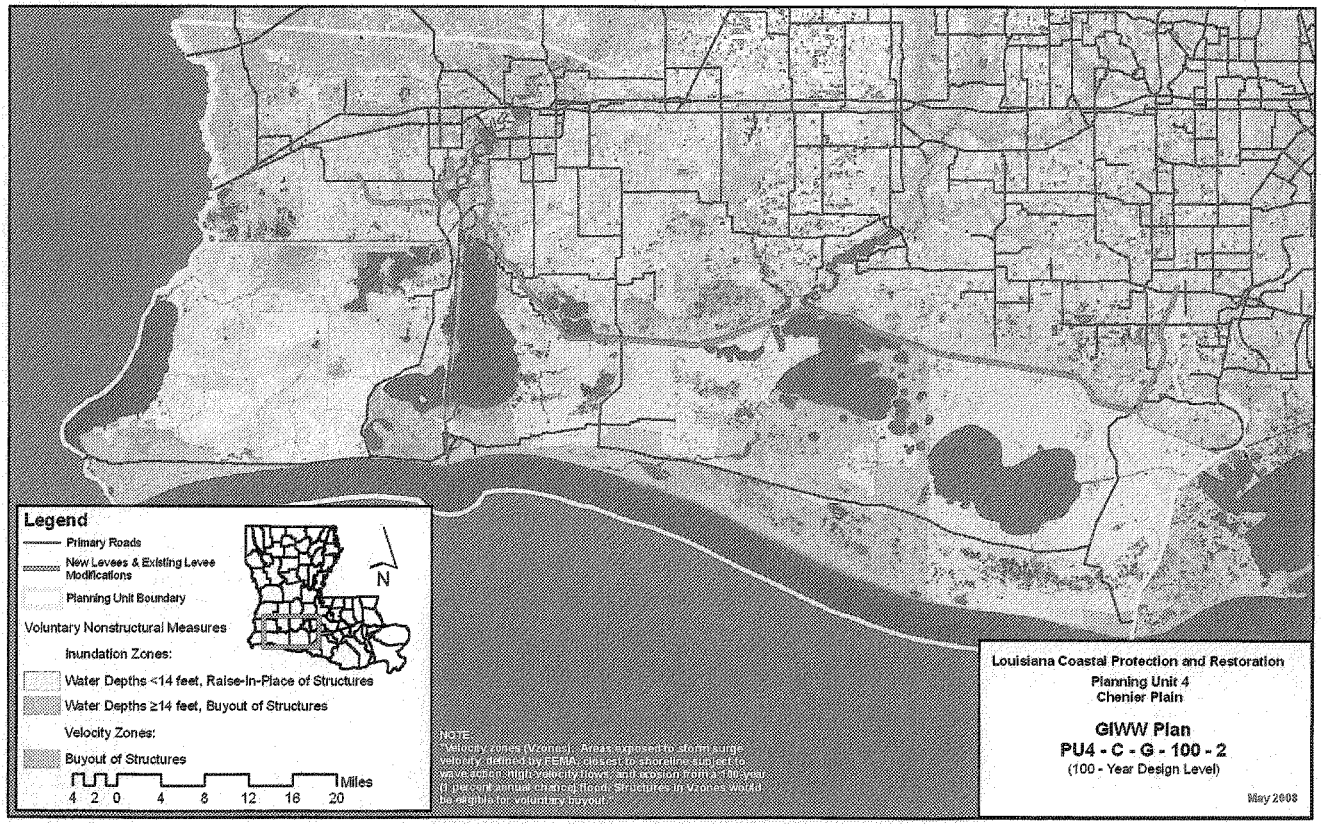
Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	1,226	1,929	109	142	363	26	139	2	0
		Mid		2,629	142	165	445	30	115	0	0
		Low		3,325	194	225	590	41	90	0	0
2	High RSLR High Employment Dispersed Population	High	1,256	2,065	116	153	377	28	139	2	0
		Mid		2,708	154	225	527	39	115	0	0
		Low		3,465	212	291	628	45	90	0	0
3	Low RSLR Business-as-Usual Compact Population	High	1,227	1,794	112	136	354	26	139	2	0
		Mid		2,436	148	159	430	29	115	0	0
		Low		3,081	206	211	580	40	90	0	0
4	High RSLR Business-as-Usual Compact Population	High	1,257	1,909	121	150	371	27	139	2	0
		Mid		2,532	164	207	510	37	115	0	0
		Low		3,217	236	262	608	43	90	0	0

Other Results			Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Construction Time (years)		10	After 50 yrs (% of baseline)	103	101	103	101
Direct Wetland Impacts (acres)		1,800	After 100 yrs (% of baseline)	106	100	106	100
Indirect Impacts (unitless)		-5	Present Value of Life Cycle Costs ($ Millions)				
Spatial Integrity (unitless)		0.44	Coastal Component	10,783	11,077	10,783	11,077
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)	Nonstructural Component	1,453	1,453	1,468	1,468
	1 / 2	8,503	Structural Component	11,785	12,065	11,785	12,065
	3 / 4	8,509	Total Project	24,021	24,595	24,036	24,611

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 4
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		Comprehensive Plan
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	GIWW Alt
10-year	472	207	725	243	511	224	794	259	100-year Design
100-year	3,034	713	4,142	1,247	3,315	697	5,183	1,596	
400-year	6,592	3,488	7,874	4,003	8,001	4,168	9,283	4,705	
1,000-year	10,316	7,412	11,581	8,019	11,241	7,548	12,313	8,125	
2,000-year	12,755	8,298	13,904	8,819	13,422	8,382	14,373	8,840	

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels.

2046


Legend
Primary Roads
New Levees & Existing Levee Modifications
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Voluntary Nonstructural Measures
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Water Depths ≥14 feet, Buyout of Structures
Velocity Zones:
Buyout of Structures
Miles
4 2 0 4 8 12 16 20
N
NOTE:
Velocity zones (V-zones) - Areas exposed to storm surge velocity defined by FEMA, closest to shoreline subject to waves and/or high velocity flows, and erosion from a 100-year (1 percent annual chance) flood. Structures in V-zones would be eligible for voluntary buyout.
Louisiana Coastal Protection and Restoration
Planning Unit 4
Chenier Plain
GIWW Plan
PU4 - C - G - 100 - 2
(100 - Year Design Level)
May 2008

2047

Planning Unit:	4	Alt. No.:	PU4-G-400-3	Category:	Comprehensive (Coastal+Structural+Nonstructural)
Alternative Description:	Comprehensive plan--Same coastal and structural measures as Alternative PU4-G-400-3 but with complementary nonstructural measures to reduce residual risk.				
Coastal Component:	R1		Nonstructural Component:		400-yr complementary measures
Structural Component:	Same as Alternative PU4-G-400-3				

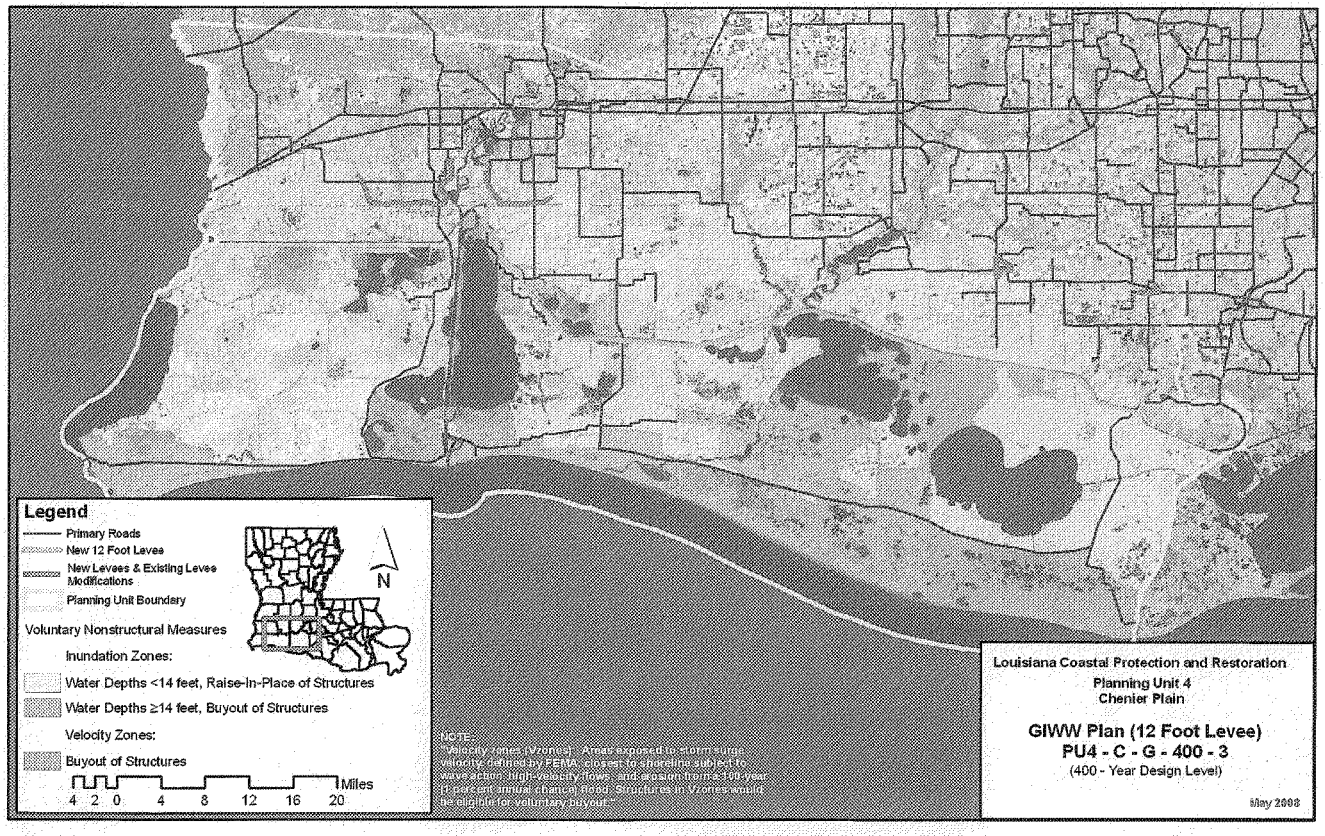
Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	1,226	1,979	100	82	243	16	139	1	0
		Mid		2,599	128	98	295	18	115	1	0
		Low		3,282	174	136	404	25	90	1	0
2	High RSLR High Employment Dispersed Population	High	1,255	2,115	106	95	263	18	139	1	0
		Mid		2,678	137	133	340	24	115	1	0
		Low		3,422	185	167	433	29	90	0	0
3	Low RSLR Business-as-Usual Compact Population	High	1,261	1,829	104	87	256	17	139	1	0
		Mid		2,408	133	102	305	19	115	1	0
		Low		3,035	182	135	417	26	90	1	0
4	High RSLR Business-as-Usual Compact Population	High	1,290	1,944	111	103	280	20	139	1	0
		Mid		2,503	145	132	346	24	115	1	0
		Low		3,171	201	163	446	29	90	0	0

Other Results			Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Construction Time (years)		10	After 50 yrs (% of baseline)	103	101	103	101
Direct Wetland Impacts (acres)		2,500	After 100 yrs (% of baseline)	106	100	106	100
Indirect Impacts (unitless)		-6	Present Value of Life Cycle Costs ($ Millions)				
Spatial Integrity (unitless)		0.44	Coastal Component	10,783	11,077	10,783	11,077
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)	Nonstructural Component	1,489	1,489	2,187	2,187
	1 / 2	8,507 8,708	Structural Component	11,732	12,012	11,732	12,012
	3 / 4	8,751 8,952	Total Project	24,004	24,578	24,702	25,276

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 4
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		Comprehensive Plan
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	GIWW Alt
10-year	472	173	725	194	511	194	794	215	400-year Design
100-year	3,034	469	4,142	554	3,315	475	5,183	560	
400-year	6,592	1,384	7,874	2,159	8,001	1,326	9,283	2,359	
1,000-year	10,316	8,519	11,581	9,252	11,241	8,009	12,313	8,792	
2,000-year	12,755	11,032	13,904	11,588	13,422	10,469	14,373	10,981	

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels.

2048


Legend
Primary Roads
New 12 Foot Levee
New Levees & Existing Levee Modifications
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Water Depths ≥14 feet, Buyout of Structures
Velocity Zones:
Buyout of Structures
4 2 0 4 8 12 16 20 Miles
N
NOTE:
"Velocity zones (V zones)" Areas exposed to storm surge velocity defined by FEMA, closest to shoreline subject to wave action, high velocity flows, and erosion from a 100-year (1-percent-annual-chance) flood. Structures in V zones would be eligible for voluntary buyout.
Louisiana Coastal Protection and Restoration
Planning Unit 4
Chenier Plain
GIWW Plan (12 Foot Levee)
PU4 - C - G - 400 - 3
(400 - Year Design Level)
May 2008

2049

Planning Unit:	4	Alt. No.:	PU4-G-1000-3	Category:	Comprehensive (Coastal+Structural+Nonstructural)
Alternative Description:	Comprehensive plan--Same coastal and structural measures as Alternative PU4-G-1000-3 but with complementary nonstructural measures to reduce residual risk.				
Coastal Component:	R1		Nonstructural Component:		1000-yr complementary measures
Structural Component:	Same as Alternative PU4-G-1000-3				

Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	1,357	1,855	87	78	232	15	139	1	0
		Mid		2,471	114	89	271	16	115	1	0
		Low		3,089	152	112	337	21	90	1	0
2	High RSLR High Employment Dispersed Population	High	1,386	1,989	92	85	244	16	139	1	0
		Mid		2,549	121	112	304	20	115	1	0
		Low		3,228	162	142	362	24	90	1	0
3	Low RSLR Business-as-Usual Compact Population	High	1,358	1,698	92	83	248	16	139	1	0
		Mid		2,273	119	94	285	18	115	1	0
		Low		2,842	161	114	353	22	90	1	0
4	High RSLR Business-as-Usual Compact Population	High	1,388	1,811	98	94	264	18	139	1	0
		Mid		2,367	130	114	315	21	115	1	0
		Low		2,978	178	139	375	24	90	1	0

Other Results	
Construction Time (years)	10
Direct Wetland Impacts (acres)	2,500
Indirect Impacts (unitless)	-6
Spatial Integrity (unitless)	0.44

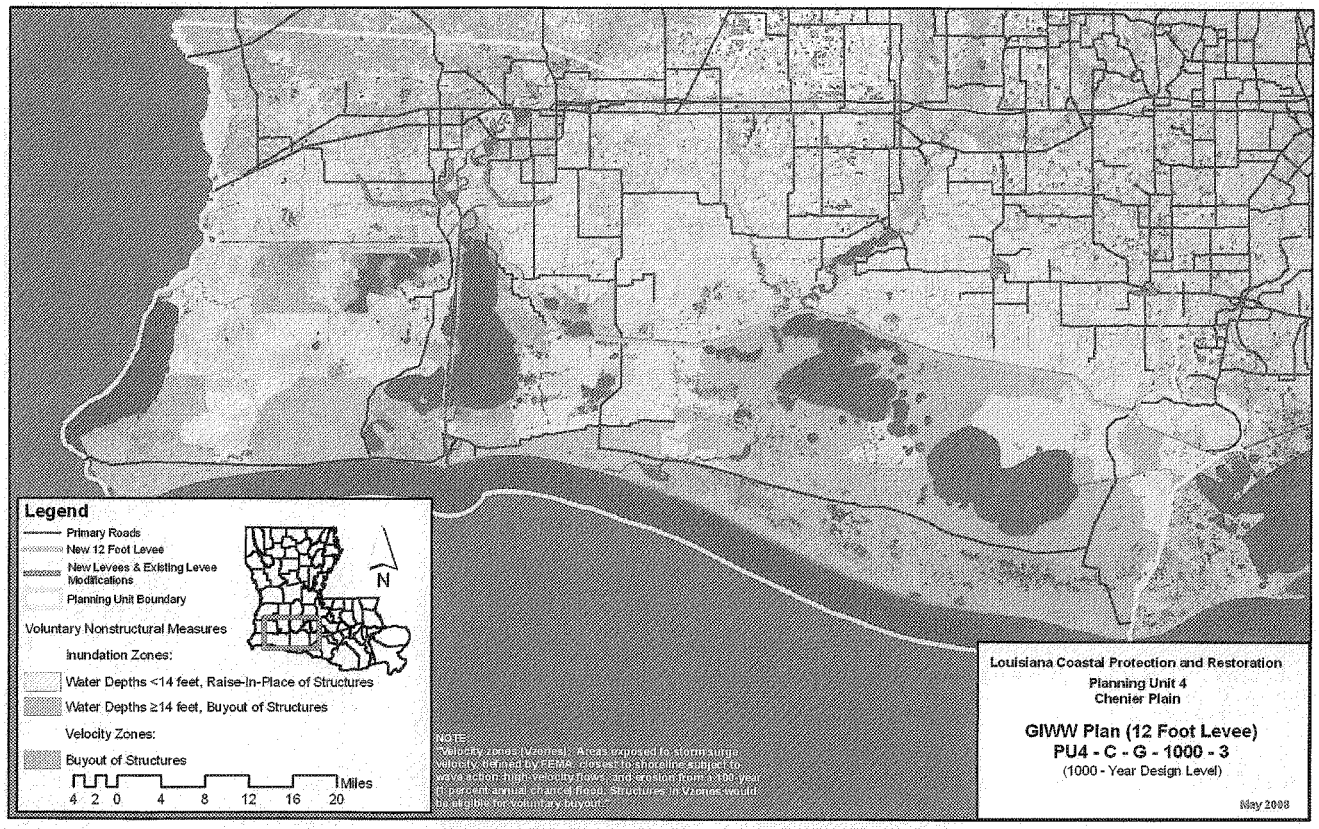
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)	
	1 / 2	9,407	9,609
	3 / 4	9,419	9,621

Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
After 50 yrs (% of baseline)	103	101	103	101
After 100 yrs (% of baseline)	106	100	106	100
Present Value of Life Cycle Costs ($ Millions)				
Coastal Component	10,783	11,077	10,783	11,077
Nonstructural Component	3,587	3,587	3,621	3,621
Structural Component	12,205	12,488	12,205	12,488
Total Project	26,575	27,153	26,610	27,187

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 4
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		Comprehensive Plan
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	GIWW Alt
10-year	472	122	725	130	511	145	794	153	1000-year Design
100-year	3,034	304	4,142	357	3,315	326	5,183	375	
400-year	6,592	864	7,874	1,127	8,001	854	9,283	1,073	
1,000-year	10,316	3,220	11,581	4,471	11,241	2,761	12,313	4,216	
2,000-year	12,755	6,445	13,904	7,378	13,422	6,097	14,373	6,970	

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels.

2050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Velocity Zones:
Buyout of Structures
4 2 0 4 8 12 16 20 Miles
N
NOTE:
"Velocity zones (Vzones): Areas exposed to storm surge, velocity defined by FEMA, closest to shoreline subject to wave action, high velocity flows, and erosion from a 100-year (1 percent annual chance) flood. Structures in Vzones would be eligible for voluntary buyout."
Louisiana Coastal Protection and Restoration
Planning Unit 4
Chenier Plain
GIWW Plan (12 Foot Levee)
PU4 - C - G - 1000 - 3
(1000 - Year Design Level)
May 2008

Planning Un	4	Alt. No.:	PU4	L-100-1	Category:	Comprehensive (Coastal+Structura	onstructural)
Alternative Description:	Comprehensive plan--Same coastal and structural measures as Alternative PU4-RL-100-1 but with complementary nonstructural measures to reduce residual risk.						
Coastal Component:	R1			Nonstructural Component:		100-yr complementary measures	
Structural Component:	Same as Alternative PU4-RL-100-1						

Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	786	2,421	105	101	272	19	109	1	0
		Mid		3,355	144	125	351	23	85	1	0
		Low		4,221	201	189	515	34	60	0	0
2	High RSLR High Employment Dispersed Population	High	802	2,654	115	114	288	20	109	1	0
		Mid		3,516	163	189	450	33	85	0	0
		Low		4,486	230	256	557	39	60	0	0
3	Low RSLR Business-as-Usual Compact Population	High	786	2,238	109	105	288	20	109	1	0
		Mid		3,092	151	131	366	24	85	1	0
		Low		3,855	212	187	534	35	60	0	0
4	High RSLR Business-as-Usual Compact Population	High	802	2,405	120	121	306	22	109	1	0
		Mid		3,241	171	180	456	33	85	0	0
		Low		4,092	253	236	560	38	60	0	0

Other Results	
Construction Time (years)	10
Direct Wetland Impacts (acres)	100
Indirect Impacts (unitless)	0
Spatial Integrity (unitless)	0.44

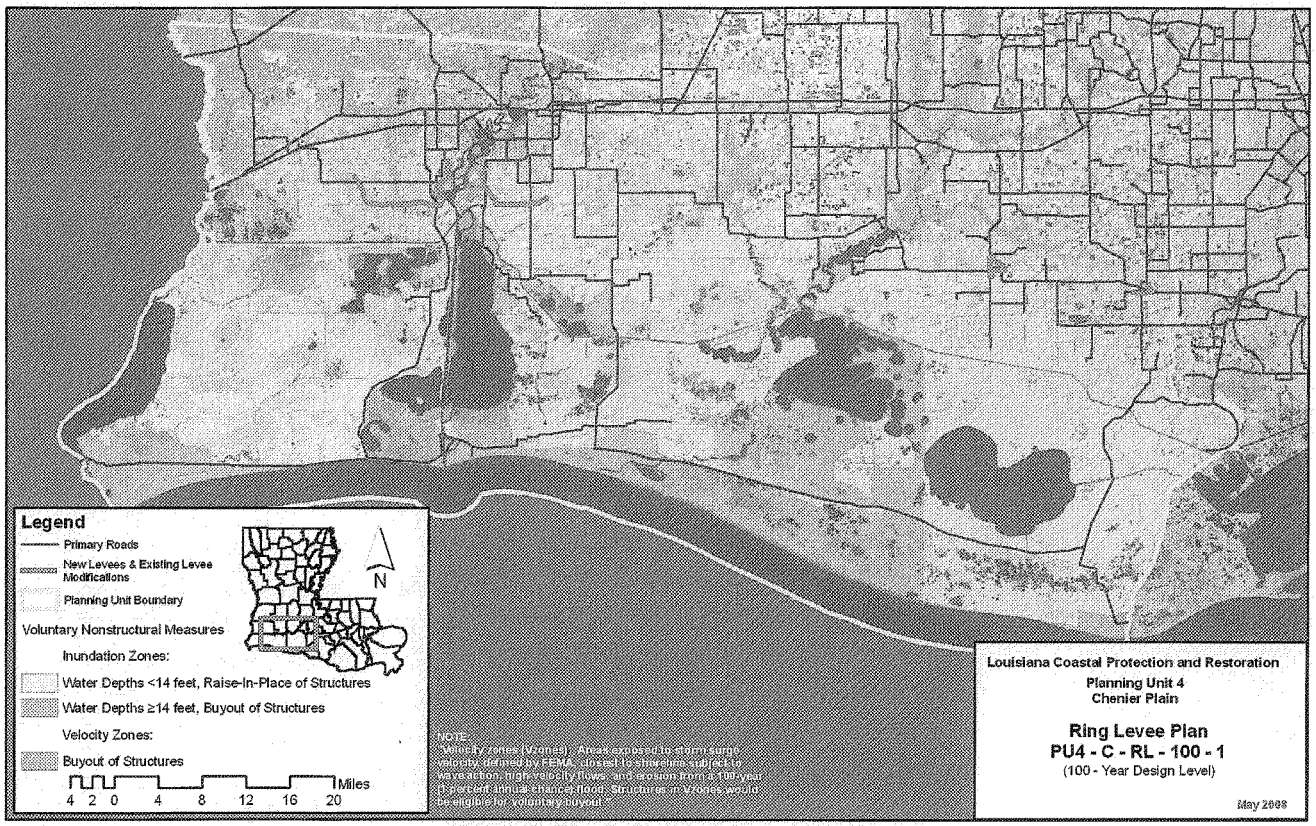
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)	
	1 / 2	5,416	5,525
	3 / 4	5,419	5,529

Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
After 50 yrs (% of baseline)	103	101	103	101
After 100 yrs (% of baseline)	106	100	106	100
Present Value of Life Cycle Costs ($ Millions)				
Coastal Component	10,783	11,077	10,783	11,077
Nonstructural Component	1,906	1,906	1,915	1,915
Structural Component	2,702	2,720	2,702	2,720
Total Project	15,391	15,703	15,400	15,712

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 4
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		Comprehensive Plan
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	Ring Levee Alt
10-year	472	183	725	211	511	206	794	235	100-year Design
100-year	3,034	1,012	4,142	2,062	3,315	993	5,183	2,405	
400-year	6,592	4,739	7,874	5,704	8,001	5,196	9,283	6,088	
1,000-year	10,316	7,608	11,581	8,554	11,241	7,517	12,313	8,247	
2,000-year	12,755	8,928	13,904	9,836	13,422	8,541	14,373	9,254	

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels.

2052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Buyout of Structures
4 2 0 4 8 12 16 20 Miles
N
NOTE:
"Velocity zones (Vzones): Areas exposed to storm surge velocity defined by FEMA, closest to shoreline subject to wave action, high velocity flows, and erosion from a 100-year (1 percent annual chance) flood. Structures in Vzones would be eligible for voluntary buyout."
Louisiana Coastal Protection and Restoration
Planning Unit 4
Chenier Plain
Ring Levee Plan
PU4 - C - RL - 100 - 1
(100 - Year Design Level)
May 2008

2053

Planning Un	4	Alt. No.:	PU4	L-400-1	Category:	Comprehensive (Coastal+Structura	onstructural)
Alternative Description:	Comprehensive plan--Same coastal and structural measures as Alternative PU4-RL-400-1 but with complementary nonstructural measures to reduce residual risk.						
Coastal Component:	R1			Nonstructural Component:		400-yr complementary measures	
Structural Component:	Same as Alternative PU4-RL-400-1						

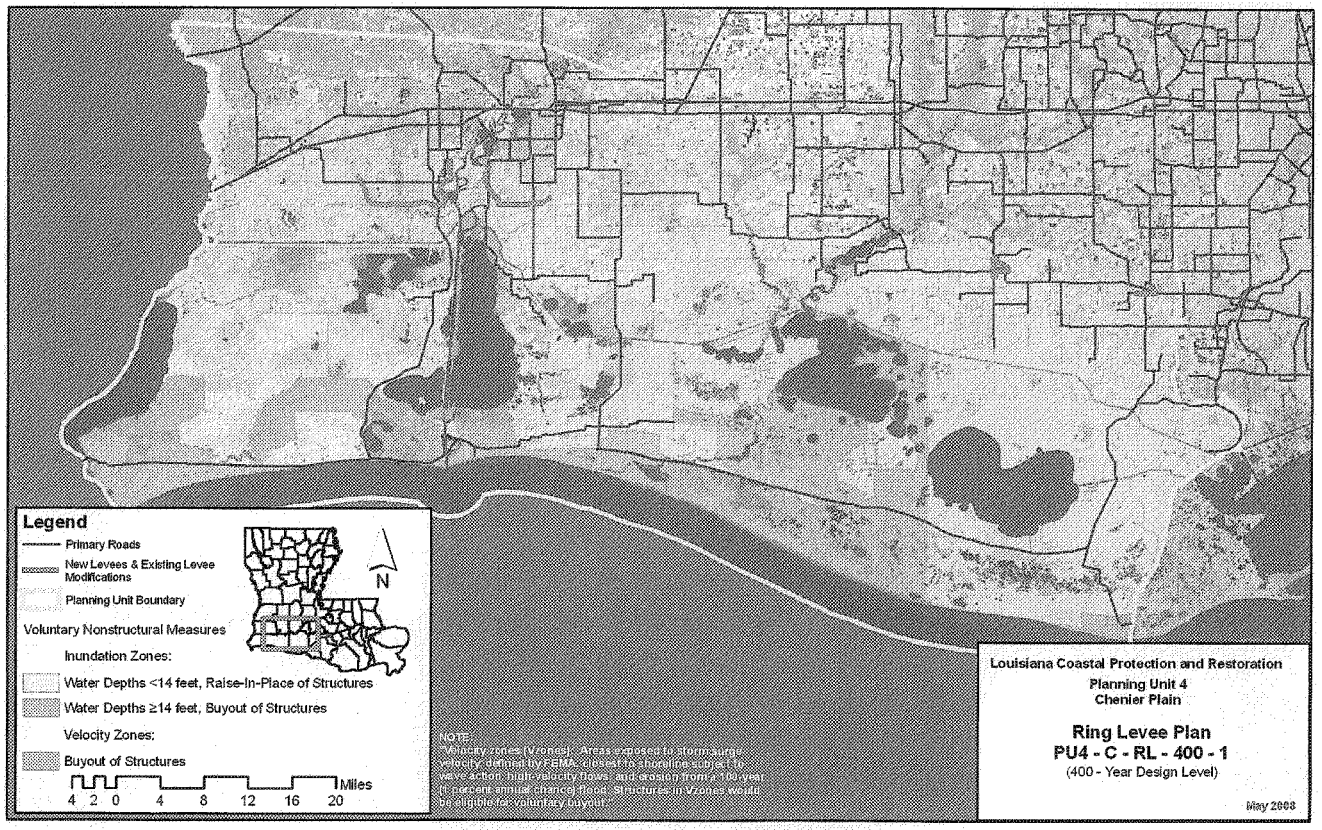
Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	813	2,294	99	78	232	15	109	1	0
		Mid		3,156	128	92	275	17	85	1	0
		Low		4,020	173	132	396	24	109	1	0
2	High RSLR High Employment Dispersed Population	High	829	2,526	106	86	242	16	109	1	0
		Mid		3,315	139	125	319	21	85	1	0
		Low		4,289	189	159	421	27	60	0	0
3	Low RSLR Business-as-Usual Compact Population	High	865	2,122	103	83	246	16	109	1	0
		Mid		2,918	134	97	286	18	85	1	0
		Low		3,672	182	132	404	25	109	1	0
4	High RSLR Business-as-Usual Compact Population	High	881	2,295	110	92	256	17	109	1	0
		Mid		3,077	147	124	326	22	85	1	0
		Low		3,924	204	154	426	27	60	0	0

Other Results			Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Construction Time (years)		12	After 50 yrs (% of baseline)	103	101	103	101
Direct Wetland Impacts (acres)		100	After 100 yrs (% of baseline)	106	100	106	100
Indirect Impacts (unitless)		0	Present Value of Life Cycle Costs ($ Millions)				
Spatial Integrity (unitless)		0.44	Coastal Component	10,783	11,077	10,783	11,077
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)	Nonstructural Component	1,670	1,670	2,696	2,696
	1 / 2	5,638	5,749	Structural Component	3,471	3,494	3,471	3,494
	3 / 4	5,997	6,108	Total Project	15,924	16,241	16,950	17,267

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)									Planning Unit 4
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4		Comprehensive Plan
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj	Ring Levee Alt
10-year	472	175	725	196	511	199	794	220	400-year Design
100-year	3,034	502	4,142	654	3,315	530	5,183	666	
400-year	6,592	1,586	7,874	3,182	8,001	1,512	9,283	3,321	
1,000-year	10,316	8,801	11,581	10,117	11,241	8,228	12,313	9,394	
2,000-year	12,755	12,031	13,904	13,034	13,422	11,133	14,373	11,933	

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels.

2054


Legend
Primary Roads
New Levees & Existing Levee Modifications
Planning Unit Boundary
Voluntary Nonstructural Measures
Inundation Zones:
Water Depths <14 feet, Raise-In-Place of Structures
Water Depths ≥14 feet, Buyout of Structures
Velocity Zones:
Buyout of Structures
4 2 0 4 8 12 16 20 Miles
N
NOTE:
Velocity zones (V zones): Areas exposed to storm-surge velocity defined by FEMA, caused by shoaling waves, wave action, high-velocity flows, and erosion from a 100-year (1 percent annual chance) flood. Structures in V zones would be eligible for voluntary buyout.
Louisiana Coastal Protection and Restoration
Planning Unit 4
Chenier Plain
Ring Levee Plan
PU4 - C - RL - 400 - 1
(400 - Year Design Level)
May 2008

2055

Planning Unit:	4	Alt. No.:	PU4-RL-1000-1	Category:	Comprehensive (Coastal+Structural+Nonstructural)
Alternative Description:	Comprehensive plan--Same coastal and structural measures as Alternative PU4-RL-1000-1 but with complementary nonstructural measures to reduce residual risk.				
Coastal Component:	R1		Nonstructural Component:		1000-yr complementary measures
Structural Component:	Same as Alternative PU4-RL-1000-1				

Scenario	Future Conditions (Relative Sea Level Rise (RSLR) and Redevelopment Assumptions)	Uncertainty	Results by Scenario with Uncertainty Bands								
			Life Cycle Cost	Population Impacted	Residual Damages	Gross Regional Output Impacted	Employment Impacted	People's Earned Income Impacted	Archeo. Sites Protected	Historic Properties Protected	Historic Districts Protected
			Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Ann. Equiv. #	Ann. Equiv. $ Millions	# Sites	# Properties	# Districts
1	Low RSLR High Employment Dispersed Population	High	921	2,145	94	76	227	14	109	1	0
		Mid		3,027	123	86	260	16	85	1	0
		Low		3,849	161	111	338	21	60	1	0
2	High RSLR High Employment Dispersed Population	High	938	2,377	101	82	236	15	109	1	0
		Mid		3,187	133	109	296	19	85	1	0
		Low		4,124	175	139	366	24	60	1	0
3	Low RSLR Business-as-Usual Compact Population	High	929	1,972	98	81	240	15	109	1	0
		Mid		2,786	129	91	273	17	85	1	0
		Low		3,502	169	113	346	21	60	1	0
4	High RSLR Business-as-Usual Compact Population	High	946	2,220	107	94	262	17	109	1	0
		Mid		2,959	140	114	312	21	85	1	0
		Low		3,728	187	139	370	24	60	1	0

Other Results			
Construction Time (years)			14
Direct Wetland Impacts (acres)			100
Indirect Impacts (unitless)			0
Spatial Integrity (unitless)			0.44
Non-Federal Share of Present Value of Life Cycle Costs	Scenario	($ Millions)	
	1 / 2	6,348	6,477
	3 / 4	6,398	6,527

Wetlands Created/Protected	Scenario 1	Scenario 2	Scenario 3	Scenario 4
After 50 yrs (% of baseline)	103	101	103	101
After 100 yrs (% of baseline)	106	100	106	100
Present Value of Life Cycle Costs ($ Millions)				
Coastal Component	10,783	11,077	10,783	11,077
Nonstructural Component	3,509	3,509	3,651	3,651
Structural Component	3,756	3,799	3,756	3,799
Total Project	18,049	18,385	18,191	18,528

2075 Residual Risk / Damages - Low Uncertainty ($ Millions)								
Frequency	Scenario 1		Scenario 2		Scenario 3		Scenario 4	
	No Action	With Proj	No Action	With Proj	No Action	With Proj	No Action	With Proj
10-year	472	154	725	174	511	176	794	197
100-year	3,034	456	4,142	538	3,315	477	5,183	557
400-year	6,592	836	7,874	1,268	8,001	761	9,283	1,090
1,000-year	10,316	2,456	11,581	4,572	11,241	2,007	12,313	4,148
2,000-year	12,755	6,837	13,904	8,526	13,422	6,171	14,373	7,581

Planning Unit 4

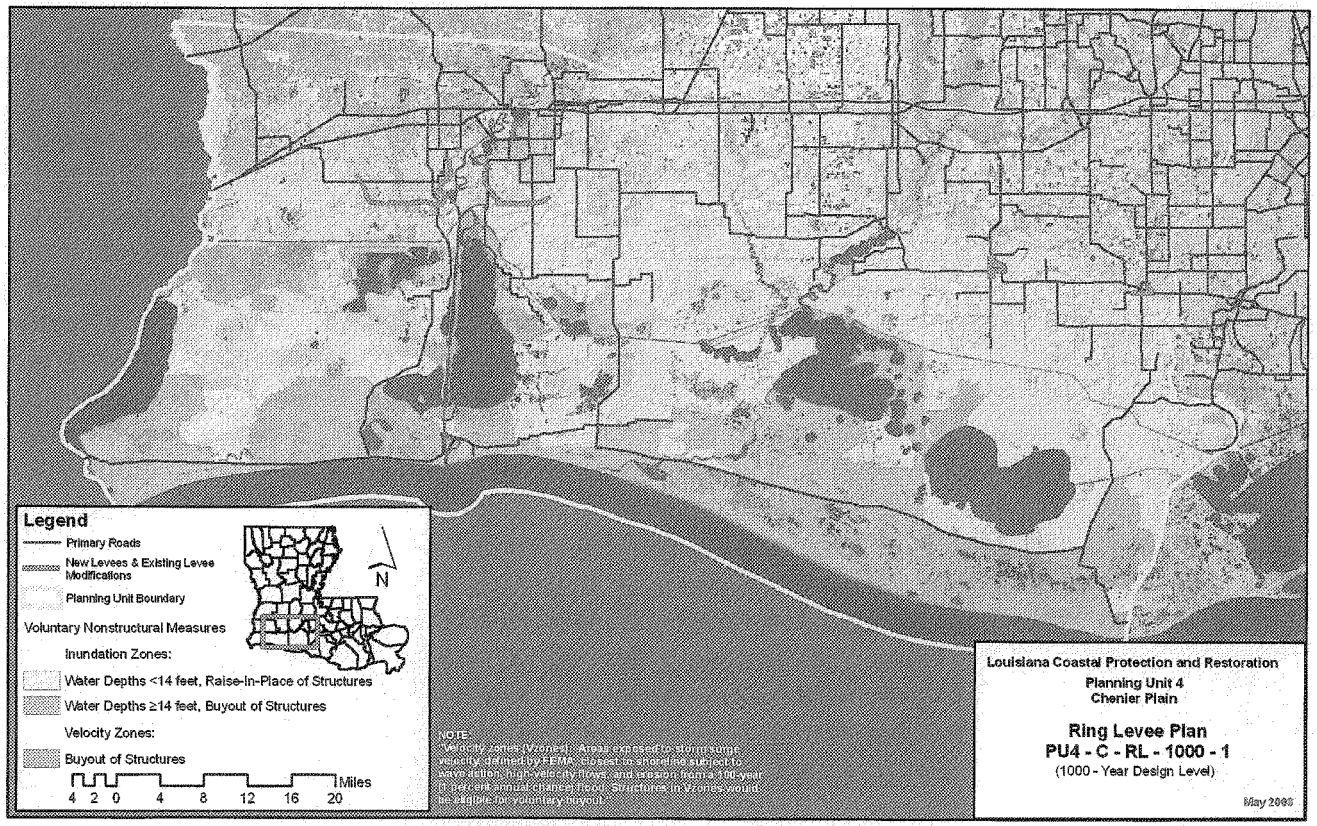
Comprehensive Plan

Ring Levee Alt

1000-year Design

Note: **Present Value** costs and **Annual Equivalent** numbers are calculated for the period from 2010 to 2075 at common base year 2025 using a 4 7/8% Federal discount rate. All dollar metrics are based on 2007 price levels.

2056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NOTE:
"Velocity zones (Vzones): Areas exposed to storm surge velocity defined by FEMA. Closest to shoreline subject to wave action, high-velocity flows, and erosion from a 100-year (1 percent annual chance) flood. Structures in Vzones would be eligible for voluntary buyout."
Louisiana Coastal Protection and Restoration
Planning Unit 4
Chenier Plain
Ring Levee Plan
PU4 - C - RL - 1000 - 1
(1000 - Year Design Level)
May 2008

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LOUISIANA COASTAL PROTECTION AND RESTORATION
FINAL TECHNICAL REPORT

RISK-INFORMED DECISION FRAMEWORK APPENDIX

June 2009

U. S. Army Corps of Engineers
New Orleans District
Mississippi Valley Division

(2059)

Louisiana Coastal Protection and Restoration (LACPR) Final Technical Report
Risk-Informed Decision Framework Appendix

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Attachment A – Application of Multi-Criteria Decision Analysis to LACPR

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GLOSSARY

Eustatic Sea Level Rise: A change in global average sea level brought about by an increase in the volume of the world ocean (Intergovernmental Panel on Climate Change (IPCC) 2007b).

Isostatic or Isostasy: Isostasy refers to the way in which the lithosphere and mantle respond visco-elastically to changes in surface loads. When the loading of the lithosphere and/or the mantle is changed by alterations in land ice mass, ocean mass, sedimentation, erosion or mountain building, vertical isostatic adjustment results, in order to balance the new load (Intergovernmental Panel on Climate Change (IPCC) 2007b).

Measure: A component of plans for risk reduction. Categories of risk reduction measures include structural, nonstructural and coastal restoration.

Metric: A parameter for quantifying the performance of plans in respect to planning objectives.

Natural variability: The heterogeneity of some attribute in a population.

Objective: In general, a *decision objective* is a statement that describes what a decision maker or stakeholder wants to achieve. Each stakeholder or decision maker may have a different set of objectives. A *planning objective* is a statement of the intended purposes of the planning process; it is a statement of what an alternative plan should try to achieve. (Note: Since metrics are just lower-level objectives within the objectives hierarchy, the terms have been used interchangeably.)

Plan: Any detailed scheme, program, or method worked out beforehand to accomplish an objective. A plan incorporates a combination of structural, nonstructural, and coastal restoration measures for risk reduction. Plans emerge from the plan formulation process.

Residual risk: The risk that remains after a risk reduction plan has been implemented.

Risk: The likelihood and severity of adverse outcomes.

Robust: A plan is robust if it remains optimal or near-optimal over most planning scenarios. May also refer to a plan that is strong enough to withstand or overcome intellectual challenges or adversity.

Stakeholder: Any organization, governmental entity, or individual that has a stake in or may be impacted by a given plan.

Uncertainty: A lack of knowledge that originates from an incomplete understanding of the structure and function of natural or manmade systems, the choice of a model to represent those systems, and the choice of the input values for the parameters of the chosen model.

1. INTRODUCTION

The Louisiana Coastal Protection and Restoration (LACPR) Technical Report has been developed by the United States Army Corps of Engineers (USACE) in response to Public Laws 109-103 and 109-148. Under these laws, Congress and the President directed the Secretary of the Army, acting through the Chief of Engineers, to:

- Conduct a comprehensive hurricane protection analysis and design in close coordination with the State of Louisiana and its appropriate agencies;
- Develop and present a full range of flood control, coastal restoration, and hurricane protection measures exclusive of normal policy considerations for South Louisiana;
- Consider providing protection for a storm surge equivalent to a Category 5 hurricane; and
- Submit preliminary and final technical reports.

This appendix describes the development and implementation of the risk-informed decision framework (RIDF), which is discussed in the main technical report. The RIDF has been developed to integrate risk and decision science methods (and detailed risk tradeoff analysis) into the USACE 6-step planning process. The attachments to this appendix provide additional data and background information on the application of MCDA to LACPR and on other evaluation criteria and plan rankings examined to further support the risk informed decision analysis.

1.1 Purpose, Approach, and Limitations of the RIDF

The LACPR team was directed to evaluate alternative solutions without reliance upon the traditional cost-benefit analysis methods. The team was encouraged to identify a final array of comprehensive, coastwide plans that will reduce risks of flooding caused by storm surge and coastline degradation while considering a full range of risks to people, cultural heritage, environment, property and economy as well as infrastructure, construction, operations, and maintenance costs. This approach is known as RIDF, or Risk-Informed Decision Framework.

As an integral part of RIDF, the team pioneered the implementation of a comprehensive evaluation of project alternatives through a multi-criteria decision making approach (MCDA) intended to provide comparable consideration of assets that are difficult to quantify in monetary terms. Over the course of the LACPR effort considerable learning regarding the possible approach to, and application of, such a framework has occurred, and it is necessary to clearly state the revealed shortcomings. Due to the time constraints of the plan formulation process for LACPR, it has not been feasible to incorporate lessons learned to improve the deterministic elements of RIDF or MCDA. However, MCDA has been a successful means to inform tradeoffs and is an effective means of communicating the wide spectrum of risks to stakeholders.

The "Risk Informed" approach to the decision process was conceptualized in response to the performance of existing storm damage reduction system and the contrast between the public perception of their relative risk and the risk designed for in existing or proposed measures. It was clear following Hurricanes Katrina and Rita that the public appreciation of their level of residual risk with some level of storm damage risk reduction in place was, if not inaccurate, inadequate. It was additionally evident that traditional decision making criteria (NED – benefit / cost) would

generally discount the impact of extreme, "Category 5" events due to their relative rarity, or low probability. While directing an investigation of measures to potentially supply reduction of risk for extreme events, Congress also alluded to that investigation being conducted in a multi-criteria environment.

The products needed to achieve these objectives are: the decision methodology needs to be refined to achieve greater sensitivity to the extreme impacts of relatively rare events; and regardless of the success at achieving the first, the process needs to provide a clearer understanding of both the relative risk reduction provided to, and the residual risk being assigned to, the public. To achieve these outcomes there are several functional needs: to define the number and range of planning criteria; to determine the potential variations and proportions of those criteria within the decision; to gather data in support of the determination and application of those proportions; and to identify or develop evaluation techniques to appropriately gauge performance relative to the criteria and to scale them to the extreme level of event being considered.

Ultimately the legislatively directed singular purpose of the LACPR effort is the reduction of storm damage risk, particularly from extreme events. For the planning effort, the need for greater sensitivity to extreme events and the better communication of risk information was identified early in the process. The directive to develop a RIDF to effectively integrate all the aspects of the needs and desired outcomes came several months into the study effort. Throughout the plan formulation process, the planning team sought to correctly identify and compare metrics for performance of each alternative, and to involve stakeholders in the evaluation and selection process. However, with the planning objectives, or criteria, already established, performance metrics already identified, and evaluations already underway, certain aspects of this framework were effectively set before RIDF was developed. Despite these constraints, the planning team sought to develop and implement RIDF, and to integrate it with their prior and ongoing efforts.

As the planning effort developed, approaches tested for the RIDF have been found to prematurely eliminate certain alternatives from consideration. Those alternatives that provide greater risk reduction or cost efficiency seem to be discounted by the MCDA process. While the development of a RIDF approach has made significant strides in pursuit of evaluation of plans in light of performance across broad criteria, it does not yet meet the initial expectations.

It was initially concluded, with Vertical Team concurrence, that the Multi Criteria Decision Analysis (MCDA) tool could be effectively adapted to achieve the needed integration of criteria, risk evaluation, and communication. The initial objective for the application of MCDA was the full development of preference data through engagement with a diverse range of stakeholders to enable identification of, and to facilitate understanding of risk reduction based alternatives. The MCDA process does provide a platform for stakeholders to express and explore the relative importance of various performance related outputs and tradeoffs. Through iterative MCDA refinement and comparison of the range of individual preference patterns, and the resulting ordering of alternatives to best achieve the desired performance, stakeholders started to gain an understanding of performance, risk, and tradeoffs. Ultimately, the refined preference data and possible alternative choices based on this understanding will inform the decision process.

Over the course of completing alternative performance evaluations, and through iterative engagement and preference elicitation, several issues concerning both the MCDA tool and its application in LACPR surfaced. It first became evident that due to the lengthy duration of the performance evaluation process it would not be possible to adequately iterate the stakeholder elicitation feedback cycle required for an effective MCDA. Although two elicitation cycles were undertaken with stakeholders, the initial lack of final metric data required that two distinctly different elicitation processes be used. The difference in these techniques effectively limited the usefulness of the first cycle to a dry run of the engagement process and data processing, which was presented for internal and external technical review. The results of the second iteration of MCDA, although procedurally more sound, reveal some apparent inconsistency between the plan rankings resulting from the weighted preference patterns and the basic criteria preferences for population protection provided by the stakeholders. This inconsistency would normally be resolved through successive iteration. However, there is not sufficient time left in the planning process for those additional iterations. Without additional iterations of MCDA, limited confidence must be placed on the completeness of the array of alternative plans identified.

The tested results from the initial MCDA stakeholder elicitation indicated that some potential for the identification of clusters of common stakeholder preference patterns might exist. When the data from the second stakeholder elicitation was similarly tested, no explainable clusters of common value could be identified. As a result, the stakeholder data, resulting preference patterns, and plan utility scores were evaluated entirely on an individual basis. The combinability of the stakeholder results was limited to ordinal rankings (based on utility score) for each individual, for any given plan, as a relative gauge of cumulative preference.

This data indicates that it might be possible to discern trends or consistencies across the individual plan rankings, despite variance in preference patterns. However, the data set is limited by the number and diversity of the stakeholders sampled. The stakeholder group sampled represented a number of public government, non-governmental organizations, and private industry groups. The sample lacks statistical significance relative to the coastal population and the relative diversity is uneven across the planning units. Both numbers and diversity should be improved upon overall. It seems unlikely that the present data set will converge on a single common preference pattern, or utility, even with adequate iteration cycles.

Based on these limitations, the planning team decided that the MCDA tool is not a viable approach for a stand-alone risk based decision process. It was also concluded that the MCDA should be continued for the LACPR effort as a method of capturing stakeholder input and facilitating the process of communicating value differences, plan tradeoffs, and relative risk.

As a result, the planning team believes that MCDA provides a valuable supplement to RIDF by providing a semi-quantitative gauge of stakeholder sentiment regarding performance value. However, for future efforts additional steps must be taken to document the relative significance and diversity of the stakeholder sample, either statistically or through comparative demography.

The LACPR planning team also believes that additional risk informing value can be derived from comparing MCDA results with more traditional decision criteria employed by the USACE. This comparison was initially developed to provide a basis for identifying commonality in plan

recommendation between these criteria. However, after further consideration it was decided that, because of the inherent variation in the decisions they potentially could produce, some reaffirmation of the result based on traditional criteria related to effectiveness, efficiency, and acceptability were fundamental to supporting the needs of fiscal decision makers. In addition they provide insight into potential tradeoffs and risk inherent in the decision process itself. Ranking results based on these criteria also provide a basis for the inclusion of alternatives that may be valued by the stakeholders based on their stated preference for plans which protect the population.

The development of evaluation criteria associated with effectiveness and efficiency also affords additional opportunity to assess sensitivity of the decision process to the impact of extreme events. Utilizing the same basic evaluation data used in MCDA, additional assessment of relative plan effectiveness were performed to contrast the effect of annualized versus episodic (based on the period of analysis) damage probabilities. The percent of cumulative potential damage reduction, based on each of the probabilistic surge events assessed, was also considered as a measure of effectiveness. These values were then be contrasted with expressions of plan costs (annual or present value) to test plan efficiency.

The application of episodic probability for damage serves two potential purposes; based on the period of analysis of 65 years employed in LACPR. First, the probabilities associated with the various level surge events (100-yr, 400-yr, 1000-yr, etc.) become more indicative of the chance of an individual experiencing those conditions within a lifetime at one location; and second those longer period probabilities produce a shift in the relative importance of rarer more extreme events and therefore illustrate the relative benefit of higher levels of risk reduction. The application of results based on this type of expression of effectiveness could indicate a greater optimal level of protection than the application of traditional, annualized data. The result of considering these varied evaluations demonstrates there is an observable variation, or potential tradeoff, and resultant risk, associated with possible decision approaches that should be considered.

In an effort to test the sensitivity of overall relative plan ranking to the varied evaluation criteria, the effect of combining these criteria was investigated. Multiple combinations of these criteria were tested, aggregating the ordinal or normalized results for each criteria set. This assessment indicated that by assigning some level of relatively equal importance to each evaluation criteria a tier of consistent optimal plan performance might be identified. As a result, this approach is employed in the report as a method of optimizing across all evaluation considerations, and identifying plans that might merit further, more detailed consideration. However due to the limitations described previously, this report can not provide any certainty as to whether any one or all of these evaluation approaches provides the truly optimal means for integrating the storm damage risk associated with extreme events.

The results of this RIDF analysis provide some insight and may be used as a foundation for further evaluation and development. However additional investigation and refinement of both the MCDA approach for stakeholder value elicitation and the consideration of impacts from extreme storm events is recommended. The Findings, and Conclusions and Recommendations Sections of

this report identify some of the needs and possible actions that might be utilized to continue to refine and development a risk informed decision approach.

1.2 Overview of the RIDF

The LACPR decision process has considered a comprehensive set of planning objectives that include reducing risk to people and assets; promoting a sustainable and diverse environment; and sustaining the unique heritage of coastal Louisiana. In addition to these numerous diverse interests, it must also be recognized that the Louisiana coastal area is a dynamic environment that is rapidly changing in ways that are difficult to predict. Prudent decision makers will therefore take account of the uncertainty regarding economic, environmental, and other conditions that may affect the outcome of a project during the planning period of analysis.

The LACPR decision problem is to identify a final array of comprehensive, coastwide plans that will reduce the risks of flooding caused by storm surge and coastline degradation while considering a full range of risks to people, cultural heritage, environment, property, and economy as well as infrastructure construction, operations, and maintenance costs. The RIDF is responsive to these and other decision support needs of LACPR for which conventional decision support methods are poorly suited. The RIDF offers a decision approach that accounts for a comprehensive set of coastal assets in Louisiana, acknowledges the presence of a diverse group of stakeholders who exhibit different interests and objectives, and considers a broad range of decision objectives, in addition to stakeholder preferences, that include efficiency, effectiveness, and costs and future funding requirements. The RIDF approach also addresses uncertainty in certain environmental, social, and economic trends over the planning period of analysis that can affect the desirability of risk reduction strategies.

Conventional approaches to decision making have emphasized cost-benefit analysis, which is suitable only when decision outcomes can be fully monetized. There is now an increasing level of consideration given to assets that are difficult to quantify in monetary terms, such as wildlife habitat and cultural diversity, which tend to confound the application of that approach. Conventional decision methods have also emphasized a single decision methodology built around contributions of proposed actions to national economic development. However, the corporate direction given to the LACPR planning effort required an accounting of impacts on regional economic development, environmental, and other social effects, as well, in the decision process. Therefore, a multi-attribute decision analysis method was used to supplement more traditional methodologies. In addition, there is diverse set of stakeholders whose interests must also be taken into account. Conventional approaches to decision making have also tended to ignore uncertainty. By evaluating and communicating uncertainty during the planning process, the RIDF helps lead decision makers to more well-reasoned and rational choices among tradeoffs. The RIDF attempts to address the shortcomings of conventional decision approaches in a manner that is consistent with the USACE planning process.

1.2.1 RIDF is based on the USACE's Planning Process, Outfitted to Incorporate Risk Analysis and Decision Analysis

The RIDF is consistent with the USACE's standard approach to planning, but augments that approach with insights and techniques drawn from the fields of decision and risk analysis, as well as providing for a comprehensive presentation of plan preferences and outputs to facilitate a

better understanding of plan tradeoffs that must be considered in making a decision. The RIDF provides procedures to help decision makers identify planning objectives, performance metrics, stakeholder priorities, and tradeoffs.

RIDF as a broader approach draws on tools such as multi-criteria decision analysis (MCDA) techniques (specifically, multi-attribute utility theory), because plan selection involves multiple, competing performance criteria denominated in in-commensurate terms, i.e., when some attributes of performance or project output such as life-cycle infrastructure costs can be expressed in monetary terms and others, such as impacts to wetlands, cannot.

The RIDF draws on risk analysis techniques to characterize and assess the uncertainties that complicate the LACPR decision and to provide for a comprehensive look at competing performance criteria under various future scenario conditions. These include uncertainties in the economic and environmental conditions that will influence the outcome of a decision (such as the rate of relative sea level rise) as well as the stochastic nature of storm surge events. The purpose is to help planners characterize the critical uncertainties most important to the choice among plans and to identify robust risk reduction strategies, which are decision alternatives that perform relatively well across a wide range of future conditions.

1.2.2 Why is RIDF "Risk-Informed?"

The RIDF is risk-informed because it:

- Accounts for the consequences of low-probability storms including expected property damages, population at risk, and regional economic impacts.
- Helps decision makers adjust their decisions to account for a lack of knowledge regarding the economic and environmental conditions that will influence plan performance.
- Provides for a better understanding of tradeoffs and remaining risks among competing areas of interests and project outputs.

1.2.3 What are the Advantages of RIDF?

The RIDF has several advantages.

- The framework engages stakeholders and decision makers in a process of issue identification and priority setting to formally establish project goals. The process helps decision makers to:
  - Identify and reveal hidden agendas
  - Identify, acknowledge and, when possible, fill data gaps that, if filled, could influence decisions;
- Objectives are expressed in the form of a multi-attribute utility function that:
  - Gives objectives that are difficult to monetize the same consideration as monetary objectives, enabling environmental and social decision objectives to receive equal consideration with economic objectives.
  - Allows decision makers to make explicit tradeoffs between objectives because progress on one objective can be used to compensate for lack of progress on another objective.

- Outputs and plan performance and evaluation scoring allow for equal consideration of stakeholder preferences, as well as cost efficiencies, project effectiveness in reducing risk and future funding requirements necessary for plan implementation.

1.3 Scope of this Appendix

This appendix provides an overview of the six planning steps in terms of the LACPR RIDF. Additional detail is provided on Step 3, formulation of plans, in the main report and in the Structural Plan Component Appendix, Nonstructural Plan Component Appendix, and Coastal Restoration Plan and Structural Environmental Impacts Appendix. Contents of this RIDF Appendix include:

- **Main Appendix**
  - Introduction, background, and scope
  - Overview of 6-step planning process and resultant outputs of the RIDF
  - Detailed descriptions of metrics and scenarios
  - Methods used to implement MCDA
  - Other decision support considerations

- **Attachment A - Application of MCDA to LACPR**
  - Results of MCDA rankings and uncertainty
  - Tables and figures showing sample outputs
  - Discussion and path forward

- **Attachment B - Decision Support Documentation (Evaluation Data and Plan Rankings to Support Risk Informed Decision Analysis)**
  - Expanded MCDA rankings
  - Multiple evaluation criteria
  - Tables showing sample outputs and plan rankings

2. BACKGROUND

2.1 Planning in the USACE – The Six-Step Planning Process

The *Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies* (also known as Principles and Guidelines or P&G) and Engineering Regulation (ER) 1105-2-100, *Guidance for Conducting Civil Works Planning Studies* sets out a 6-step planning process:

1. Specify problems and opportunities;
2. Inventory, forecast and analyze conditions relevant to the identified problems and opportunities;
3. Formulate alternative plans;
4. Evaluate the effects of the alternative plans;
5. Compare alternative plans;
6. Recommend a plan from the compared alternatives.

Since publication of the P&G in 1983, USACE planning and decision-making have been primarily based on a comparison of alternatives using economic factors. Planners have also been confronted with the challenge to provide for integrated systems that serve multiple objectives (e.g., a coastal system that provides for flood and storm damage reduction, navigation, and ecosystem restoration) and/or whose performance is measured using evaluation criteria factors for conflicting decision objectives not all measured in monetary terms.

2.2 Changes in the Planning Landscape

In response to a USACE request for a review of P&G planning procedures, the National Research Council (1999) provided recommendations for streamlining planning processes, revising P&G guidelines, analyzing cost-sharing requirements and estimating the effects of risk and uncertainty integration in the planning process. Implementation guidance of the Environmental Operating Principles (EOP) (http://www.hq.usace.army.mil/cepa/envprinciples.htm) within USACE civil works planning directs that projects adhere to a concept of environmental sustainability that is defined as "a synergistic process whereby environmental and economic considerations are effectively balanced through the life of project planning, design, construction, operation and maintenance to improve the quality of life for present and future generations" (USACE 2003a, p. 5). While adhering to the overall P&G methodology, USACE (2003b) advises project delivery teams to formulate acceptable, combined economic development/ecosystem restoration alternatives through use of multi-criteria/trade-off methods.

2.3 USACE's Efforts to Address Planning Needs

Over the last several years, the USACE has been developing approaches and guidance for implementing multi-criteria decision analysis (MCDA) approaches for planning (Yoe, 2002; Linkov et al. 2004; Kiker et. al. 2005). This approach utilizes a comprehensive decision analytic framework that considers a broad array of objectives and criteria/metrics, including those associated with ecosystem restoration (Males, 2002). Guidance contained in *Trade-Off Analysis Planning and Procedures Guidebook (2002)* lays out a multi-criterion decision analytic approach for comparing and deciding between alternative plans and relates the P&G six-step planning process described above to outputs of the RIDF, as depicted in Figure 1.

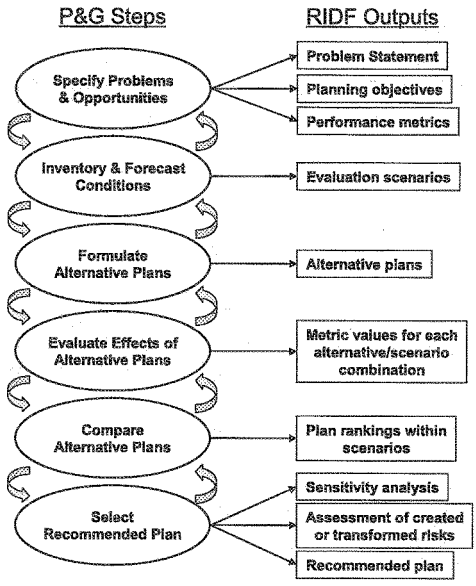

Figure 1: The 6 steps of the P&G and resultant outputs of the risk-informed decision framework.

2.4 How is RIDF an Incremental Improvement in Addressing Planning Needs?

Making effective and credible flood and storm damage reduction planning decisions requires an explicit structure for jointly considering the positive/negative impacts and risks, along with associated uncertainties, relevant to the selection of alternative plans. The complexity of flood and storm damage reduction and coastal landscape stabilization in South Louisiana requires integration of multiple models and tools as well as expert judgment. Integrating this heterogeneous and uncertain information demands a systematic and understandable framework to organize complex and, in some cases, limited technical information and expert judgment and then presenting such information in a way to clearly show tradeoffs among possible choices or decisions.

3 IMPLEMENTATION OF THE RIDF

The RIDF assists decision makers by condensing the decision problem into a transparent and tractable format. The RIDF can be described in terms that are closely aligned with the standard USACE approach to planning. It utilizes techniques from the fields of risk and decision analysis to accommodate multiple objectives, conflicting stakeholder values, both qualitative and quantitative assessments of performance, and uncertainty in the natural, social, and economic environment in which decisions will be played out.

As implemented for LACPR, the RIDF procedure can be summarized as follows. Decision makers and stakeholders establish an objectives hierarchy to fully and uniquely characterize the important outcomes of each decision alternative. A set of outcome measures of performance (or metrics) is then chosen to represent the performance of each alternative in terms of achieving each of the planning objectives. The outcomes of the alternative plans are modeled and, to the extent there are uncertainties present that may significantly affect performance outcomes, this evaluation of plans is replicated over a set of scenarios that represent a range of possible conditions during the performance phase. Once all of these evaluations are complete, a multi-attribute utility function is developed (based on stakeholder assigned values for performance metrics) to assess the overall utility of each plan given its performance in terms of achieving the objectives. Ranking plans based on their individual utility scores is used to provide an indication of stakeholder preferences of plan options available. The LACPR RIDF procedure has also utilized outputs of evaluations of other decision objectives (e.g., cost efficiencies and project effectiveness) to contrast with stakeholder preferences to identify a final array of alternatives (or top performing plans across all decision objective considerations) and to display tradeoffs among these alternatives for decision makers.

The relationship between the USACE planning process and RIDF is illustrated in Figure 1. RIDF activities for the LACPR effort are closely related to the 6-step USACE planning process as follows:

1. Specify Problems and Opportunities: Frame the decision by developing a problem statement and identifying the spatial and temporal boundaries of analysis (i.e. planning area and planning units). Establish planning objectives and choose outcome measures of performance, or metrics, which reflect progress toward achieving the planning objectives.
2. Inventory and Forecast Conditions: Select models of physical and economic systems or other appropriate tools to simulate decision outcomes in terms of the selected performance metrics. Identify important sources of uncertainty in physical and economic models.
3. Formulate Alternative Plans: Formulate decision alternatives by identifying potential measures for flood risk reduction, pre-screening poor performing measures, and formulating an array of alternatives for each LACPR planning unit from remaining measures.
4. Evaluate Effects of Alternative Plans: Model the outcome measures of performance for each alternative and each scenario.
5. Compare Alternative Plans: Obtain weights on metrics from the decision makers and/or stakeholder groups. Calculate multi-attribute utility and implement the stakeholder preference analysis for each alternative and scenario. Identify consistently dominating plans in each planning unit based on the multi-attribute utility values. Develop alternative ranking of plans based on assessment of evaluation criteria addressing other decision objectives viewed as important to decision makers. Conduct an indexed scoring of alternatives based on the MCDA results and alternative plan rankings. Identify the final array of alternatives for each planning unit and prepare detailed tradeoff analysis of plan performance and outputs for these alternatives. Apply secondary evaluation criteria and sensitivity analysis (e.g., varying levels of participation in nonstructural measures

and analysis of alternatives under degraded coastal conditions). Screen out plans that are consistently dominated.

6. Select a Recommended Plan: Develop strategies for combining top performing alternatives in each planning unit to create comprehensive coastwide plans. Develop conclusions and findings based on the above analyses.

3.1 Step 1: Specify the Problem and Opportunities

Framing the problem to be solved is one of the most difficult and critical tasks in the planning process because it forces planners to clarify their objectives. Framing also helps to identify what attributes should be considered in judging decision outcomes and what metrics should be used in assessing progress toward meeting the identified planning objectives. Framing helps to establish what spatial and temporal scales are needed for modeling decision outcomes. For example, the preferred alternative may change with the spatial resolution chosen for an analysis; therefore, factoring such spatial variation into how the framework is used along the coast should be considered. Similarly, the most preferred decision may vary as a function of the timeframe under consideration: a longer planning timeframe may lead to a preference for alternatives with higher fixed costs and lower operational/maintenance costs.

3.1.1 Problem Statement

The people, economy, and environment of coastal Louisiana are vulnerable to flooding caused by the storm surge associated with major hurricanes. This high vulnerability is caused by a uniformly low-lying landscape and severe disruption of a once natural process of sediment deposition and marsh-building associated with the lowermost Mississippi River.

Louisiana's coastal plain has suffered system-scale instability and deterioration from the early 1900s to the present. Effects in the region stem from a combination of natural and human-induced activities that extend into the entire Mississippi River Basin. Drastic landscape changes that have already occurred and are predicted to take place this century place in jeopardy coastal populations, assets, and ecosystems that must exist to continue producing benefits regionally and nationally. Catastrophic impacts of the 2005 Atlantic Tropical Cyclone season in the Gulf of Mexico (as well as subsequent impacts from the 2008 season) revealed the need for additional investment in flood and storm damage risk reduction and coastal ecosystem restoration along the entire Louisiana coast.

LACPR coordinated its planning effort with parallel efforts in other agencies and maintained a continuous exchange of ideas and information with those agencies throughout the planning process. The LACPR project is being coordinated via extensive public involvement through a series of workshops, public scoping meetings, and stakeholder forums. In addition, the USACE is coordinating with other water resources plans and projects including navigation, flood control, and ecosystem restoration projects. These other efforts include the 100-year Hurricane Storm Damage and Risk Reduction System in the New Orleans metropolitan area, Interagency Performance Evaluation Team Task Force (IPET) Study, State of Louisiana Coastal Protection and Restoration Authority (CPRA) Master Plan, and Louisiana Recovery Authority (LRA) Community Recovery and Redevelopment Planning, among many others.

A comprehensive atlas of potential structural, nonstructural, and ecological measures was compiled after the scoping and stakeholder input process (LACPR Plan Formulation Atlas, dated 16 April 2007). This atlas of measures provided the foundation for alternative plan formulation and is available at http://www.lacpr.usace.army.mil/.

Engagement with LACPR stakeholders has continued and has provided further input on problems, solutions, and values.

The following problem statement was drafted with the above issues in mind: The people, economy, environment, and culture of South Louisiana, as well as the Nation, are at risk from severe and catastrophic hurricane storm events as manifested by:

- Increasing risk to people and property from catastrophic hurricane storm events.
- Increasing vulnerability of coastal communities to inundation from hurricane induced storm damages due to coastal subsidence, wetland losses, and relative sea level rise.
- National and regional economic losses from hurricane flooding to residential, public, industrial, and commercial infrastructure / assets.
- Losses to high levels of productivity and resilience of South Louisiana coastal ecosystem due to natural conditions and coastal storm disturbances.
- Risks to historic properties and traditional cultures and their ties and relationships to the natural environment due to catastrophic hurricane storm events.

The risks associated with such complex problems can rarely be eliminated or entirely prevented. Thus, residual risks that will remain after plan implementation must be considered. The nature of the risks to the planning area is identified in the problem statement.

3.1.2 Planning Objectives

The purpose of this section is to delineate the objectives appropriate to a sound solution to the LACPR decision problem that can be readily articulated to an array of audiences.

As a group, a good set of planning objectives must be collectively exhaustive. That is, nothing that really matters can be left out. However, and again with an eye to simplification, the list must be limited to only the ones that really do matter. Each objective should be specific and succinct (Keeney and Raffia 1976). An objective must be unambiguous yet succinctly stated, as brevity helps communication and clarifies thinking. Progress toward each objective must be measurable using one or a few metrics so that predictions can be quantified and performance can be assessed. Objectives must also be realistically achievable and relevant. Finally, there must be concordance with practical time frames (Hobbs and Meier 2000). In other words, predictions must be possible within the planning time frame or monitoring of performance must be possible within a useful time frame.

The objectives, decision attributes, and measures of performance used in this analysis were developed by the LACPR Technical Team. The planning objectives for LACPR are:

- Reduce risk to public health and safety from catastrophic storm inundation;
- Reduce damages from catastrophic storm inundation;

- Promote a sustainable coastal ecosystem;
- Restore and sustain diverse fish and wildlife habitats, and;
- Sustain the unique heritage of coastal Louisiana by protecting historic sites and supporting traditional cultures.

3.1.3 Outcome Metrics of Performance

Metrics to be used to guide the LACPR evaluation are presented in Table 1. These metrics were used to score and then rank flood and storm damage reduction measures and plans. In selecting this set of metrics, we strove to represent the best available information for evaluating alternatives in the LACPR, keeping in mind the characteristics of effective metrics (see Roy, 1985; Seager et al. 2007, Graedel and Allenby 2002, Seager and Theis 2004; Yoe 2002). Metrics for LACPR were selected as being:

- **Verifiable.** Two independent assessments yield similar results.
- **Cost-effective.** The technology required to generate data for the metrics is economically feasible and does not require an intensive deployment of labor.
- **Easy to communicate to a wide audience.** The public understands the scale and context of the metric and can interpret the metric with little additional explanation.
- **Changeable by human intervention.** The metric has a causal relationship between the state of the system and the variables that are under the decision-maker's control. Metrics that are independent of human action do not inform a management, policy-making, or design process.
- **Credible.** Stakeholders perceive that the metric accurately measures that which it is intended to measure.
- **Appropriate scale.** The metric is applicable at the spatial and temporal scales chosen for analysis.
- **Directed.** Metric scales, whether they are qualitative or quantitative, are bi-directional polar scales.
- **Relevant.** The metric reflects stakeholder priorities and enhances the ability of managers and regulators to faithfully execute their stewardship responsibilities. There is no point assembling a metric no one cares about.
- **Sensitive.** The metric will capture the minimum meaningful level of change in performance, and it will have uncertainty bounds that are easy to communicate.
- **Minimally redundant.** Measures for the metric are not essentially reflected by another metric in the set being used.
- **Transparent.** The metric avoids "readily unapparent and/or known agendas."

It is important to acknowledge here that there will be "conflicts" among plan performance as measured by these metrics, resulting in the need to make tradeoffs. For example, a tradeoff may exist between achieving any significant storm surge risk reduction from a project and minimizing direct and indirect environmental impacts. The tradeoff concept is discussed in Step 5. As a consequence of such "conflicts," a given measure or alternative may not take clear precedence over other measures or alternatives in respect to every metric for evaluating performance. This may present a dilemma to decision-makers, who are trying to choose a single measure or plan, or in the case for LACPR, a final array of alternatives. It is important to place development of

metrics prior to formulating plans because the "hard thinking" that goes into developing the metrics can create an improved set of measures from which to formulate plans; this in turn permits stakeholders to focus on thinking about the objectives rather than anchoring themselves to favored measures (Keeney and Raiffa 1976).

Within a particular scenario, uncertainty is clarified by delineating the magnitude of uncertainty surrounding metric value estimates. Metric estimates depend upon a mathematical model, empirical data from a study, or expert opinion. All of these sources share varying degrees of knowledge uncertainty, presumably more so for expert opinion than for models and studies. Along with indicating the basic source of metric estimates, it is necessary to explicitly state the important underlying assumptions and indicate which are highly uncertain, moderately uncertain, or highly certain. Beyond these fundamental elements, estimates of uncertainty for metric values should be quantified (e.g., in terms of the variance or range associated with the estimate). Such quantification of the level of uncertainty surrounding metric estimation must be captured and integrated in the decision analysis to make risk-informed decisions.

Table 1 lists the metrics used in LACPR. For complete descriptions of all metrics used in this effort, please see Section 12 in the Main Report.

For simple systems, metrics may be easy to enumerate and interpret and inexpensive to parameterize. However, in cases such as LACPR, which involve both complex human and natural system drivers, development of measurable performance standards poses significant challenges. Both natural and human systems involved in restoration planning are complicated and relate to one another in a myriad of ways. Consequently, any set of metrics is incomplete and may at best be considered only representative of the decision factors that could be brought to bear on the situation. For this reason, metrics are often referred to as indicators to emphasize the representational relationship these measures have to the state of complex systems. They are indicative – but not definitive – gauges, and consequently must be interpreted with their limitations in mind.

In selecting the set of metrics for LACPR, we strove to represent the best available information for evaluating alternatives, keeping in mind the characteristics of effective metrics. The final set of metrics presented in Table 1 reflects a combination of input from the technical team and input from stakeholders. While every effort was made to adhere to all metric criteria, not all criteria were met for a given metric.

Table 1. LACPR Objectives and Metrics.

Planning Objective	Metric (Units)	Metric Goal	Metric Description
Reduce risk to public health and safety from catastrophic storm inundation.	Population Impacted (# of people/year)	Minimize	The number of residents who would experience any amount of flooding after implementation of an alternative plan. This metric represents the residual risk to health and safety of the residential population impacted. In general, the worst case value for this metric represents no action. All risk reduction measures (coastal, nonstructural, and structural) provide improvement in value for this metric. However, because raise-in-place components do not eliminate risk to people, nonstructural measures may not be the most effective in reducing this metric value.
Reduce damages from catastrophic storm inundation.	Residual Damages ($ Millions/year)	Minimize	The remaining risk to assets from flooding after implementation of an alternative plan. Residual damages include damages to residential and non-residential properties, emergency response costs, losses to agricultural resources, and damages to transportation infrastructure. In general, the worst case value for this metric represents no action. All risk reduction measures (coastal, nonstructural, and structural) provide improvement in value for this metric.
	Present Value Life-Cycle Costs ($ Millions/year)	Minimize	The total cost of implementing an alternative plan, which includes engineering and design, construction, facility relocation, operations and maintenance, real estate, and mitigation costs. State and local costs would be 35% or more of the total cost. The best case value for this metric represents no action. All risk reduction measures (coastal, nonstructural, and structural) serve to increase the value for this metric.
	Construction Time (Years)	Minimize	The length of time required to design and construct an alternative plan so that most of its intended benefits are realized. The best case value for this metric would be small structural plans. (For the no action alternative, a minimum construction period of 15 years was assumed). All risk reduction measures (coastal, nonstructural, and structural) serve to increase the value for this metric.
	Employment Impacted (# of jobs disrupted/year)	Minimize	The number of jobs that would be disrupted for one or more days as a direct consequence of flooding after implementation of an alternative plan. In general, the worst case value for this metric represents no action. All risk reduction measures (coastal, nonstructural, and structural) provide some improvement in value for this metric.

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Planning Objective	Metric (Units)	Metric Goal	Metric Description
Promote a sustainable coastal ecosystem.	Indirect Environmental Impact Score (Unit-less scale: -8 to +8)	Maximize	The severity of potential aquatic ecosystem impacts (positive or negative) relative to other alternatives in the planning unit. This metric considers impacts to hydrology, fisheries, the potential to induce development of wetlands, and consistency with coastal restoration goals. Qualitative scores fall within the following ranges: -8 to -5 = Highly adverse impact, -4 to -1 = Moderately adverse impact; 0 = No impact (or sum of positive and negative impacts equal to zero); 1 to 4 = Moderately positive impact; 5 to 8 = Highly positive impact. The no action value for this metric is represented by zero. The relative influence on the value for this metric varies for structural risk reduction measures. Nonstructural and coastal measures do not produce any value for this metric.
Restore and sustain diverse fish and wildlife habitats.	Direct Wetland Impacts (acres)	Minimize	The amount of wetlands that would be displaced by an alternative plan. The acreage impacted includes the levee footprint and adjacent borrow areas used for levee construction. These wetland impacts would be offset by creating more acres of wetlands within the impacted basin as mitigation for proposed actions. The best case value for this metric represents no action or no structural risk reduction action. Nonstructural and coastal measures do not produce any value for this metric. Structural measures serve to increase values for this metric.
Sustain the unique heritage of coastal Louisiana by protecting cultural sites and supporting traditional cultures.	Historic Properties Protected (# of properties)	Maximize	The number of historic properties protected by an alternative plan. Historic properties include those listed or eligible for listing on the US Park Service's National Register of Historic Places or register of National Historic Landmarks. Historic properties are protected by hurricane risk reduction alternatives that reduce land loss, erosion, and flooding. The worst case value for this metric represents no action. All risk reduction measures (coastal, nonstructural, and structural) provide some improvement in value for this metric.
	Historical Districts Protected (# of districts)	Maximize	The number of historic districts protected by an alternative plan. Historic districts encompass living communities consisting of clusters of historic buildings and/or other structures that share a similar date or theme. Historic districts are protected by hurricane risk reduction alternatives that reduce land loss, erosion, and flooding. The worst case value for this metric represents no action. All risk reduction measures (coastal, nonstructural, and structural) provide some improvement in value for this metric.

Planning Objective	Metric (Units)	Metric Goal	Metric Description
	Archaeological Sites Protected (# of sites)	Maximize	The number of archeological sites protected by an alternative plan. Archeological sites may include the remains of buildings, trash pits, hearths, pottery and tools (stone, metal and other materials). Archeological sites are protected by hurricane risk reduction system alternatives that reduce land loss, erosion, and flooding. The worst case value for this metric represents no action. All risk reduction measures (coastal, nonstructural, and structural) provide some improvement in value for this metric.

3.2 Step 2: Inventory and Forecast to Establish Baseline Conditions

In this step of the planning process, models and tools are selected to simulate decision outcomes in terms of the selected performance metrics. Each of the alternative plans will perform more or less well depending, in part, on social, economic, and environmental conditions during the planning period of analysis. However, these conditions are beyond the control of decision makers and there is much uncertainty about these conditions. Uncertainty is a lack of knowledge that originates from an incomplete understanding of the structure and function of natural or manmade systems (e.g., coastal hydraulics at the mouth of the Mississippi). [1] Uncertainty is often classified as either model uncertainty or parameter uncertainty. Model uncertainty originates from lack of knowledge about the proper structure of a model (*e.g.*, choice of a two vs. a three dimensional model to simulate hydrodynamics). Parameter uncertainty originates from lack of knowledge about the best value to use as an input parameter value for the chosen model.

Decision analytic techniques enable decision makers to make rational decisions despite uncertainty. Rational decisions can be made by accounting for the most important sources of uncertainty, which are those that account for the largest source of error in predictions of decision outcomes. Decision analysis works best when the uncertainty in input values can be fully characterized. However, if it is not possible to do so, decision support can also be achieved by analyzing the robustness of the optimal plan over the scenarios that represent the possible social, economic, and/or environmental conditions under which plan performance might be realized. The LACPR Technical Team selected three uncertain input variables from hydrologic and economic models and simulated performance outcomes for four scenarios. These variables are relative sea level rise, the employment growth rate, and regional land-use policy.

[1] Although the mathematics used to describe variability and uncertainty is essentially similar, uncertainty is widely recognized as being distinct from natural variability. Variability describes the heterogeneity in an inherently random value. For example, the heterogeneity of some size attribute within a population. This variability is, in principle, not reducible (Morgan and Henrion 1990). In contrast, uncertainty can be thought of as a lack of knowledge about what parameter value to use in a model or how to represent a process in a mechanistic model. This lack of knowledge might in principle be reduced, although reducing some uncertainties can often be difficult in practice.

Relative Sea Level Rise

Hydrologic models are used to simulate property damage from storm surge and associated impacts on the regional economy. The uncertain input considered in hydrologic models is the relative rate of relative sea level rise (RSLR). Relative sea level rise is the net effect of eustatic and isostatic changes in sea level. The exact rates of relative sea level rise used in modeling plan performance vary by planning unit to reflect differences in observed rates along the Louisiana coast. In general RSLR may take one of two values: it may be "low" or "high." In Planning Units 1 and 4, "low" means a relative sea level rise of 1.3 feet for 2060. "High" means a relative sea level rise of 2.6 feet for 2060. In Planning Units 2, 3a and 3b, "low" and "high" relative sea level rise are 1.9 and 3.2 feet, respectively for 2060.

Employment Growth Rate

Economic models are used to simulate development over the planning period of analysis. The variable selected for uncertainty analysis is the employment growth rate. These patterns differ in terms of the rates of employment growth. Employment growth may be described as "high" or "business-as-usual". The ***high employment*** future development scenario assumes that the State of Louisiana will implement policies that will be conducive to employment growth in non-traditional industries such as technology. The ***business-as-usual*** (BAU) future development scenario assumes that the State of Louisiana will continue the policies that were in place before Hurricane Katrina, and that growth will primarily occur in the traditional Louisiana growth industries such as oil and gas, medical research, and tourism.

Land Use Allocation Policy

LACPR originally considered three general land-use allocation policies, one leading to dispersed development, one leading to compact development, and one leading to a hybrid development state. Each scenario describes the location and type of development expected to take place throughout southern Louisiana. The location of future development was primarily based on the existing and projected transportation system in each area. However, other factors, including current and projected commercial activity, land elevation, susceptibility to flooding, and other hazards were also considered. The ***compact land*** allocation assumes that redevelopment will primarily take place within the five metropolitan statistical areas in coastal Louisiana, with the construction of more multi-family housing units relative to single family dwellings. The ***dispersed land*** use allocation assumes that redevelopment will be spread out from the major cities and that there will be more single family residential construction relative to multi-family dwellings.

LACPR's original intent was to use these three variables to develop twenty-seven scenarios for simulating the performance of each plan and assess the sensitivity of performance metrics to these planning assumptions. The number of scenarios was reduced to four by collapsing the employment growth rate and the land-use allocation policy into a single variable and dropping the hybrid land-use policy because the scenarios produced limited variation in the modeled performance outcomes. The four scenarios selected by the LACPR Technical Team for use in risk-informed decision making are shown in Table 2.

Table 2: Four scenarios (k) developed for LACPR.

		Relative Sea Level Rise	
		(Low)	(High)
Pattern of Development	High employment / dispersed population	$k = 1$	$k = 2$
	BAU employment / compact population	$k = 3$	$k = 4$

Scenarios provide an overall structure for considering future with and without project conditions.

3.3 Step 3: Formulation of Alternative Plans

3.3.1 Plan Formulation

Plan formulation is the process of building plans that meet planning objectives and account for planning constraints. It requires the knowledge, experience, and judgments from many professional disciplines, as well as the views of stakeholders, other agencies and non-governmental organizations (NGOs), and the public. Plan formulation capitalizes on imagination and creativity wherever it is found, across technical backgrounds and group affiliations. Formulating plans includes developing management measures (e.g., structural and nonstructural), identifying planning units, conducting screening of measures, and combining measures into alternative plans. Plans can be modified into the future within the adaptive management framework. For more details on the formulation of plans and planning units for LACPR, refer to the main report and the Structural Plan Component Appendix, Nonstructural Plan Component Appendix, and Coastal Restoration Plan and Environmental Impacts Appendix.

3.4 Step 4: Evaluate Effects of Alternative Plans

Once the plans have been formulated, the performance of each plan with respect to each metric is estimated for each decision alternative and scenario. The LACPR Technical Team accomplished this step using mechanistic or empirical models of physical, economic, and social systems where available and expert judgment where such models were not available. Descriptions of the models used to generate metric data are presented in the Hydraulics and Hydrology Appendix, Economics Appendix, Coastal Restoration Plan and Structural Environmental Impacts Appendix, etc.

3.5 Step 5: Compare Alternative Plans

The purpose of this section is to provide an overview of the approach used to compare alternative coastal protection and restoration plans. Sub-section 3.5.1 describes how information on stakeholder preferences is incorporated into the decision making process using the multi-criteria decision analysis. Sub-section 3.5.2 describes the calculation of a multi-attribute value score and the ranking of alternatives based on stakeholder preferences. Sub-section 3.5.3 describes sensitivity analysis of the rankings produced through application of MCDA. The results of the MCDA are provided in Attachment A. Attachment B to this appendix provides a summary of

other miscellaneous Decision Support Documentation considerations, in addition to MCDA, that were used to support the LACPR RIDF.

When comparing alternative plans using MCDA, the objective is to rank the decision alternatives (plans) using a multi-attribute value score that integrates information about anticipated plan performance outcomes and stakeholder interests. The approach used for the MCDA ranking of LACPR plans is based on multi-attribute utility theory (MAUT) (Keeney and Raiffa 1976). With respect to its applications in LACPR, the advantage of MAUT is that it converts a multi-objective (or in the case for LACPR, multi-criteria) decision problem with competing outputs/project performance indicators into a single objective decision problem for which the decision objective is to maximize a multi-attribute value score given information about the stakeholder's preferences. Here and elsewhere in this report, including Attachment A, we refer to the multi-attribute value function as a multi-attribute utility function to distinguish it from single attribute value functions used in its calculation, although the outcomes over which stakeholders express their preferences are presented as deterministic outcomes rather than uncertain outcomes.

3.5.1 Stakeholder (MCDA) Preferences

The first step toward developing a multi-attribute utility function was to collect information on stakeholder preferences by finding out how much importance stakeholders placed on the various outcome performance metrics. Information about stakeholder preferences is obtained through workshops during which stakeholders participated in a series of assessments designed to obtain information on their preferences, which were expressed as relative weights on outcome performance metrics. These weights were subsequently incorporated into a multi-attribute utility function that was then used to calculate the utility score by which alternatives were ranked. This process gives stakeholders an active role in the decision making process because, if stakeholder weights are used in the utility function, then the resulting plan rankings provide direct information to decision makers about stakeholder preferences. *(Note: The MCDA rankings representing stakeholder preferences, along with the alternative rankings developed to address other decision objectives viewed as important to decision makers (e.g, cost efficiency and project effectiveness, etc.) were used to develop an Indexed Scoring Table for each planning unit to produce combined evaluation criteria rankings of alternatives. The final array of alternatives has been identified from these combined evaluation rankings. This process is described in detail in the main report. Additional Decision Support Documentation to this process is provided in Attachment B to this appendix.)*

Since stakeholders can exhibit a diverse set of preference patterns, it is important to consider how this diversity of preference will be treated in the decision analysis. If there are a large number of stakeholders, it may be very difficult to consider each one's preferences individually. In addition, there would be much redundancy in such an approach because many stakeholders could share some recognizable preference patterns. On the other hand, aggregating preferences of a large stakeholder population into a single group and averaging their weights to represent an amalgamated public interest may not be a good strategy, particularly if a wide diversity of values have been expressed.

The initial approach used in the LACPR analysis was to treat each stakeholder's weights individually. No inferences about the prevalence of any preference pattern within the LACPR planning area were made based on the weight elicitation results. The primary interest was in understanding what patterns of preference exist in the planning area and what affect these different patterns of preference might have on the choice of a risk-reduction plan. However, based on a trend analysis of the frequency of which plans were ranked in the top five positions by all respondents, it became clearly apparent that a consistent set of alternatives were preferred by most of the stakeholders, regardless of differences in preference patterns.

In the end, since there was not much difference in the individual preference patterns expressed for all the alternatives evaluated in each planning unit, with very few outliers or alternative preference patterns identified, the ordinal rankings of all alternatives for each respondent were totaled to produce an aggregated score for ranking all alternatives in a planning unit in to a single listing. A similar ranking was also developed for each future scenario for each planning unit, resulting in very similar results across scenarios. This expanded ranking application is addressed in Attachment B to this appendix. This expanded trend analysis ranking was used to represent the overall stakeholder preferences in identifying the final array of alternatives. This ranking also reflected the same top plans as identified in the limited trend analysis presented in Attachment A to this appendix.

3.5.2 Multi-attribute Utility Scores

The multi-attribute utility function transforms the metrics for the several objectives to a single, aggregate measure of utility. The utility function is compensatory in the sense that it allows progress on one objective to substitute for lack of progress on another objective. The rate of compensation depends upon the relative weight on each objective, which depends upon the preferences of the decision maker. Multi-attribute utility (U) is the weighted sum of L value functions, $V(m_{jkl})$, which are evaluated for each performance metric, m: $U_{jk} = \sum_{l} w_l V(m_{jkl})$.

Outcome measures of performance are evaluated through modeling studies for $j = \{1,2,3,...,J\}$ decision alternatives and $k = \{1,2,3,...,K\}$ planning scenarios. A set of weights (w) that reflects the relative importance of each decision objective is elicited from the decision maker and/or stakeholders using a swing weighting procedure (see Section 4.2). Weights may take any value between zero and one, but must sum exactly to one. Value scores are then calculated from a linear utility function for each metric, $V(m_{jkl})$, that is either increasing or decreasing with that metric, m_{jkl}. For an economic "good" (*i.e.*, more is better): $V(m_{jkl}) = \dfrac{m_{jkl} - \underset{jk}{MIN}(m_{jkl})}{\underset{jk}{MAX}(m_{jkl}) - \underset{jk}{MIN}(m_{jkl})}$

and for an economic "bad": $V(m_{jkl}) = 1 - \dfrac{m_{jkl} - \underset{jk}{MIN}(m_{jkl})}{\underset{jk}{MAX}(m_{jkl}) - \underset{jk}{MIN}(m_{jkl})}$, where the *MIN* and *MAX* functions are over all decision alternatives (plans) and planning scenarios. Value and utility scores are bounded by 0 and 1 so that scores closer to 0 indicate less desirable outcomes. For "risk-based metrics" that are functions of the stage-frequency curves for storm surge elevations in each census block (residual damages, population impacts, employment impacts, historic properties protected, historic districts protected, and archeological sites protected), we used an

expected value of each metric to calculate the value score. Expected values of metrics were calculated assuming a triangular distribution for residual damages, population impacts, and employment impacts. Expected values of metrics were calculated assuming a uniform distribution for the historic properties protected, historic districts protected, and archeological sites protected metrics. These distributions were constructed over estimates of the 10th, 50th, and 90th percentile outcomes for each metric. Metric outcomes are listed in the metric tables that are included in the Evaluation Results Appendix.

3.5.3 Risk-Informed Decision Making

Decision analysis is a useful approach to making decisions in the face of uncertainty. In decision analysis, the preferred alternative is the one that that maximizes *expected* utility. The expected utility of a decision alternative is: $E[U_j] = \sum_{k=1}^{K} p(k)U_{jk}$. E is the expectation operator and U_j is the utility of the decision alternative j for a given distribution of probabilities across K scenarios such that $\sum_{k=1}^{K} p(k) = 1$. U_{jk} is the utility of the jth decision alternative given the kth scenario.

Implementation of MCDA for LACPR was generally limited because of constraints limiting the ability to calculate metric outcomes for a full complement of scenarios. Therefore, in this application of the risk-informed decision framework, we do not maximize expected utility across the scenarios. Rather, we implement a "Scenario Planning" approach to evaluate the sensitivity of plan rankings under a limited set of scenarios. These scenarios differ in terms of the rate of sea-level rise and the future pattern of development that are assumed over the planning horizon (*e.g.*, the employment growth rate and population distribution). We examine the sensitivity of plan rankings and the robustness of the alternative that maximizes utility under each scenario. Sensitivity analysis can be an effective tool for establishing confidence in rankings and, ultimately, the decisions the planning process and rankings inform. We also consider the sensitivity of plan rankings to stakeholder preferences (allocations of weight among metrics). As previously stated above, but worth repeating again here, ***these results reveal that some plans are consistently preferred by stakeholders despite differences in their preference patterns.***

3.6 Step 6: Recommend a Plan (or in the case for LACPR, identifying a final array of alternatives)

MCDA results assist decision makers by helping them to make tradeoffs among conflicting decision criteria and to identify the plan preferred by stakeholders that maximizes utility for the expressed preference pattern. There are advantages to using a methodical and rational approach to decision making rather than an ad-hoc approach. In contrast to an ad-hoc approach, MCDA forces the decision maker to compile information on all of the preferences and assumptions about decision outcomes to calculate a utility score. Therefore, MCDA forces transparency that should lead to greater acceptance of the identification of stakeholder preferences because stakeholders can see how the decision has been reached. Even stakeholders who might be somewhat at odds with the findings have the potential to see and understand the rationale for why a certain set of alternatives were identified to represent stakeholder preferences. These preferences will be

included in the multiple plan rankings submitted for further consideration by decision makers in assessing overall performance and tradeoffs in addressing all decision objectives.

There is a strong theory underlying MCDA. Therefore, if adequate attention has been given to the numerous requirements of the method during the course of analysis, the results of an MCDA should be reliable – ***meaning that the decision alternative that maximizes the utility function should be the alternative that is in fact preferred by the stakeholder who supplied the weights.*** These requirements include satisfying the theoretical assumptions of the method as outlined in Keeney and Raiffa (1976), such as ensuring the completeness and comprehensiveness of the objectives hierarchy. Other requirements include adequate modeling of performance outcomes, and accurately assessing the preferences of the decision maker based on all decision objectives, as previously discussed.

What does it mean if a decision maker is uncomfortable with the results of an MCDA and doesn't believe that results represent an accurate portrayal of stakeholder preferences? This could occur, for example, if a stakeholder who supplies information about his or her preferences does not agree that the plans that yield the highest levels of utility are in fact the best alternatives among the choice set and accurately represents their preferences. One possibility is that this suggests that the assumptions of the method were violated or there were other errors in conducting the analysis, such as in modeling performance outcomes. Another possibility is that the MCDA has led the stakeholder to an unexpected result. If that is the case, then hard thinking about why a particular result emerged should enable the decision maker to explain how the result was obtained and why it is an accurate expression of stakeholder preference. In both cases, the stakeholder and decision maker is engaged in a process of learning more about the decision problem, including the planning objectives, the alternatives, the outcomes, and preferences. This process of learning about the decision problem and preferences is an important part of MCDA.

If a decision maker has spent sufficient time learning about the decision problem and developing an analysis, the results of MCDA can be used to help select a decision alternative, but it may not be the only decision objective that needs to be considered. There are several points to consider before choosing an alternative or set of alternatives for further consideration. One is that MCDA is not an exact science. Given a particular preference pattern, large differences in utility scores might be used with reasonable confidence to identify those alternatives that perform relatively well and those alternatives that perform relatively poorly. However, care should be taken not to infer too much from small differences in utility scores because of the potential for error in evaluating those utility scores. Therefore, an alternative that has a relatively high utility score but not the highest score might reasonably be selected by the decision maker as the preferred alternative of stakeholders.

In addition, an assessment of alternative evaluations addressing other decision objectives that are viewed as important to decision makers and that don't appear to be captured in the current MCDA application to LACPR may need to be looked at to advance a final decsion. For example, it appears that the MCDA ranking of alternatives seems to minimize and in some cases ignore the importance of alternatives that provide for a greater level of risk reduction and cost efficiencies and prematurely eliminates these from further consideration by decision makers. It is also believed that further iterations of the stakeholder engagement in the MCDA process may

also need to be conducted to obtain better convergence of stakeholders on preferred alternatives and to assure results do in fact represent stakeholder views and desires.

Another point to consider is that all rankings of alternatives are conditional on the preferences expressed by the stakeholder. When there are multiple stakeholders, whose preferences should be used in evaluating the utility scores? One approach is to evaluate the utility scores considering each of the stakeholder preferences separately. If some alternatives consistently appear among those with the highest utility scores for many different stakeholders, the decision maker might reasonably conclude that these alternatives have broad acceptability among the stakeholder population. Assuming that stakeholder acceptance is important to the decision maker, this result could lead the decision maker to advance these alternatives over others. Alternatives that are broadly acceptable may not be best for any one stakeholder, but they lead to consensus because the outcomes are reasonably good for a large number of stakeholders.

4 FINDINGS

The following findings are related to the stakeholder MCDA process and evaluation criteria described in this appendix:

MCDA provides value in interfacing with outside interests and understanding performance preferences. The MCDA tool provides an excellent means of interfacing with stakeholder and interested parties and identifying and quantifying their values regarding areas of plan performance. The tool also provides a working platform to allow these parties to explore their value beliefs and develop their understanding of how those values translate to plan preferences and their attendant risks. The collection of stakeholder input, assessment of their values and preferences, and the communication of those relationships provides insight to the planning team and decision makers regarding potential tradeoffs between alternatives and their acceptability.

The development of evaluation data for the metrics selected in an MCDA is critical. Although the MCDA performed in the LACPR technical analysis has provided great insight with regard to stakeholder values and where performance tradeoffs exist further refinement of metric evaluations would enhance overall confidence in the final output. Several of the selected metrics in the LACPR analysis were limited in their evaluation due to the complex nature of the needed analysis relative to the large number of alternatives and time available. More detailed methodologies have been investigated for the evaluation of both regional economic outputs and cultural and sociological impacts. These investigations are presented in the appendices of this report to support the development of future planning efforts. The indirect environmental impact metric has also been identified for future refinement. Indirect impacts have been assigned to the alternative plans qualitatively using expert judgment and applying a scale of -8 to +8. This particular metric value provides a representation of significant potential ecologic impacts that is one of the most significant areas of tradeoff between alternative plans. The current qualitative scale is deceptive in its representation of these impacts relative to other significant, and quantitatively gauged performance factors such as expected damage, cost, and population impacted. Future refinement of the LACPR effort should include steps to adequately analyze and quantify potential indirect impacts.

MCDA has key requirements and limitations as a plan selection methodology. The application of MCDA should begin at the onset of study scoping and support the development of plan formulation and the plan evaluation. Although all information gathered directly from stakeholders may provide valuable insight, without adequate iterations of engagement and information feedback with stakeholders full confidence can not be developed in the plan preference information produced using MCDA. Most importantly, even with adequate development and stakeholder engagement, the MCDA tool does not represent a stand alone plan selection process.

Comparison of performance tradeoffs are critical to risk informed decision making. While the MCDA tool can provide a clearer appreciation of the performance values across a range of key performance attributes, certain critical performance criteria should always be considered independently and compared to allow full understanding of risks and tradeoffs. Decision makers must always consider efficiency, effectiveness, and ultimately costs. Consideration should also be given to environmental tradeoffs, if not independently through the MCDA methodology.

Consideration of risk reduction for extreme events or a range of events requires use of non-traditional evaluations of efficiency and effectiveness. The traditional annualized presentation of cost and damages minimizes the potential impact of large storm surge events by expressing their probability over a short, one year, timeframe. Considering the probability of these larger events occurring over a longer period (perhaps the period of analysis, i.e. 65 years) more effectively communicates true damage risk levels. The individual event probabilities and relative damage risks would change by an order of magnitude or greater when considering such a timeframe. Some consideration should be given to whether the period of analysis or a longer "period of performance" might be appropriate. The comparison of plan preferences based on both annualized values and period of analysis values may be useful in alternative screening.

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Attachment A - Application of Multi-Criteria Decision Analysis to LACPR

Louisiana Coastal Protection and Restoration (LACPR) Final Technical Report
RIDF Appendix Attachment A – Application of MCDA to LACPR

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ATTACHMENTS

Attachment 1 – Stakeholder Workshop Participants
Attachment 2 – Stakeholder Workshop Script
Attachment 3 – Stakeholder Initial Survey Results
Attachment 4 – Stakeholder Exit Survey Results
Attachment 5 – Swing Weights for Stakeholders Participating in LACPR Workshops, July 2008.

1. Introduction

The purpose of this attachment is to describe the application and results of the Multi-Criteria Decision Analysis (MCDA) to the LACPR Risk-Informed Decision Framework (RIDF). MCDA was applied to LACPR to provide structured opportunities for stakeholder communication and interaction and to help ensure that decision makers are aware of stakeholder objectives and preferences. This approach enables decision makers to consider a diverse set of decision objectives and evaluate plan outcomes while making tradeoffs among those objectives in a manner consistent with their own preferences and the preferences of other stakeholders.

2. Stakeholder Workshops

The purpose of the stakeholder workshops was to collect information on stakeholder preferences by finding out how much importance stakeholders place on the various decision objectives. Hence, by design, stakeholders did not rank plans. Information about stakeholder preferences was obtained through a series of workshops during which stakeholders participated in assessments that obtained information on their preferences. These preferences were expressed as relative weights on decision objectives. These weights were later incorporated into a multi-attribute utility function that was then used to calculate the utility score by which decision alternatives were ranked.

Stakeholders were invited in advance of the workshops via email by the LACPR Technical Team to participate in the workshops. Stakeholder workshops were held in four locations across coastal Louisiana to assess individual stakeholder preferences with respect to the ten performance metrics chosen to evaluate the decision alternatives. Workshops were held at the Vermilion Parish Library in Abbeville (28 July), at the Civic Center in Lake Charles (29 July), at the Lindy Boggs Building on the campus of the University of New Orleans (30 July), and at the Municipal Auditorium in Houma (31 July). Two sessions were held at each workshop to promote stakeholder participation: a morning session (10 am to noon) and an afternoon session (2 to 4 pm). Stakeholders were recruited by MVN to participate in these workshops based on their participation in previous LACPR stakeholder meetings and/or their affiliation with a particular organization (including business, government, and non-profit representing a diverse set of stakeholder interests). These groups and individuals were invited by the LACPR technical team in advance to ensure diversity of opinions (see participation lists in Attachment 1).

As a sample of the general population, the selection and size of workshop attendees was not intended to be scientific, representative, or random. These workshops, however, specifically targeted people representing an array of diverse stakeholder groups who have either previously participated in USACE planning studies or who expressed interest in LACPR. Out of the more than 500 stakeholders who were personally invited to these workshops, more than 100 stakeholders attended. Although no one from the public was turned away, they were not specifically targeted for this exercise. The purpose of the workshop was to get a sampling of different views and to see what impact different stakeholder views could have on the ranking of alternatives.

Prior to the workshop, USACE provided stakeholders with an overview of LACPR, the workshop, and the ten performance metrics. During the workshop, stakeholders received a brief update on the status of LACPR and participated in a preference assessment using a computerized survey instrument designed specifically for this project. Results of the preference assessment were used to derive the weights for the multi-attribute utility functions used in ranking plans. During the workshops, the LACPR Technical Team developed and followed a script that detailed what was to be communicated to the stakeholders at each session. The script, in its entirety, is provided in Attachment 2. This ensured that stakeholders were consistently receiving the same technical information across sessions (see Attachment 2).

The LACPR Technical Team began each stakeholder session by 1) describing the progress of LACPR, the background and purpose of the workshop, and answering stakeholder questions, 2) discussing the ten metrics, their definitions, and implications, and 3) describing the swing weight method through the use of a simple car-buying example. The technical team then demonstrated how to use the survey instrument considering the same car-buying example in order to familiarize stakeholders with the mechanics of the survey instrument. The survey instrument consisted of six parts including:

1. Login screen: Participants provided general information about themselves and their organization affiliation (if any).
2. Entry survey: Stakeholders responded to an initial set of screening questions meant to assist in explaining observed differences in preferences.

3. Swing weight elicitation: Stakeholders completed a two-stage procedure that included: 1) ranking the potential improvements in each metric considering a hypothetical outcome with all metrics at their worst possible level; and 2) rating those potential improvements to indicate the importance of each improvement relative to the top-ranked improvement. Metrics were presented to each stakeholder in a unique random order (*i.e.*, the order presented to each respondent was different) to avoid biasing the results. In subsequent steps of the weight elicitation, metrics and the potential improvements in those metrics were presented in the order that the respondent ranked them.
4. Indirect monetization: The implied willingness-to-pay for potential improvements in metrics was calculated from swing weights using the life-cycle cost metric as a reference variable for monetization. Stakeholders were asked either to confirm the implied willingness-to-pay for each potential metric improvement or revise their ratings to more accurately reflect their willingness-to-pay. Almost all stakeholders made some revisions to their ratings and modified their swing weights; however, the indirect monetization weights did not perform significantly better (or worse) in terms of their ability to predict the outcome of choice experiments in any planning unit (see item 5, below). Therefore, we did not use indirect monetization weights to calculate the multi-attribute utility scores. Preference was given to the weights obtained by swing weighting because that method is widely recognized and was specifically recommended by the National Academy of Sciences review panel.
5. Choice experiments: Stakeholders were given a set of ten choices between two outcomes that differed in terms of the ten metrics and were asked to select their preferred outcome. The results of the choice experiments are used to validate both the swing weights and the indirect monetization weights. The choices offered were actual plans, but respondents were not told that these were actual plans. An example of a choice set follows (each respondent was given ten choice sets). The respondents were instructed as follows: "You are being asked to make a series of ten choices between two possible decision outcomes. Carefully consider the two possible decision outcomes shown in the table below. Each outcome differs in terms of one or more metrics. Fill in the radio button underneath the outcome that you prefer and click the submit button."

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Metric	Outcome A	Outcome B
Life-cycle Project Cost ($ Million / year)	2,880	1,112
Residual Damages ($ Million / year)	478	387
Resident Population Impacted (# / year)	34,302	34,496
Employment Impacted (# Jobs disrupted/ year)	1,753	1,333
Construction Time (Years)	16	14
Indirect Impacts (Unitless scale, -8 to +8)	-8	-8
Direct Wetland Impacts (Acres)	7,500	1,000
Archeological Sites Protected (# Sites)	326	295
Historic Properties Protected (# Properties)	146	133
Historic Districts Protected (# Districts)	50	50
Select the preferred outcome:	**O**	**O**

6. Exit survey: Stakeholders responded to a series of questions to assess their level of understanding of what they had done and obtain feedback on the process.

Since decisions in each planning unit are made independently, a separate set of weights was needed in each planning unit, requiring one iteration of the survey instrument for that planning unit. Stakeholders were given an opportunity to complete multiple iterations of the survey instrument for each planning unit. Plans under consideration for each planning unit were displayed in the room at each workshop location. Participants had the opportunity to view and discuss these plan alignments with the LACPR Technical Team before the workshop began. Plans were not provided as an integrated part of the survey instrument. More information about the survey instrument is provided in Attachment 2.

2.1 Workshop Participants

A total of 114 individual stakeholders participated in one or more workshop sessions, yielding 154 completed surveys in the five planning units. Sample sizes achieved in this effort were consistent with, if not higher than, the level of participation observed at previous LACPR stakeholder meetings. Table 1 shows the number of surveys completed in each planning unit. An inventory of participants and their affiliation is provided in Attachment 1. Stakeholders were affiliated with a variety of organizations including businesses, government agencies, non-profit organizations, and academic institutions (Table 2). Tables A1-1 to A1-4 in Attachment 1 list in alphabetical order by location the people (and corresponding affiliation) who participated in the LACPR stakeholder sessions. Results of the survey instrument are summarized in Attachments 3 and 4.

Table 1. Number of Completed Surveys for each Planning Unit.

Planning Unit	Number of Surveys Completed
1	45
2	27
3a	30
3b	25
4	27

Table 2. Respondents by Organization Type

Organization Type	Planning Unit					Total
	1	2	3a	3b	4	
Business	3	3	7	0	3	16
Federal agency	2	4	5	3	5	19
Not-for-profit	11	5	4	6	5	31
State agency	8	2	6	5	4	25
Local government	6	6	3	2	4	21
Parish government	6	4	2	3	2	17
Academia	2	0	0	0	1	3
Other	7	3	3	6	3	22
Number of Survey Responses	45	27	30	25	27	154

2.2 Swing Weight Elicitation

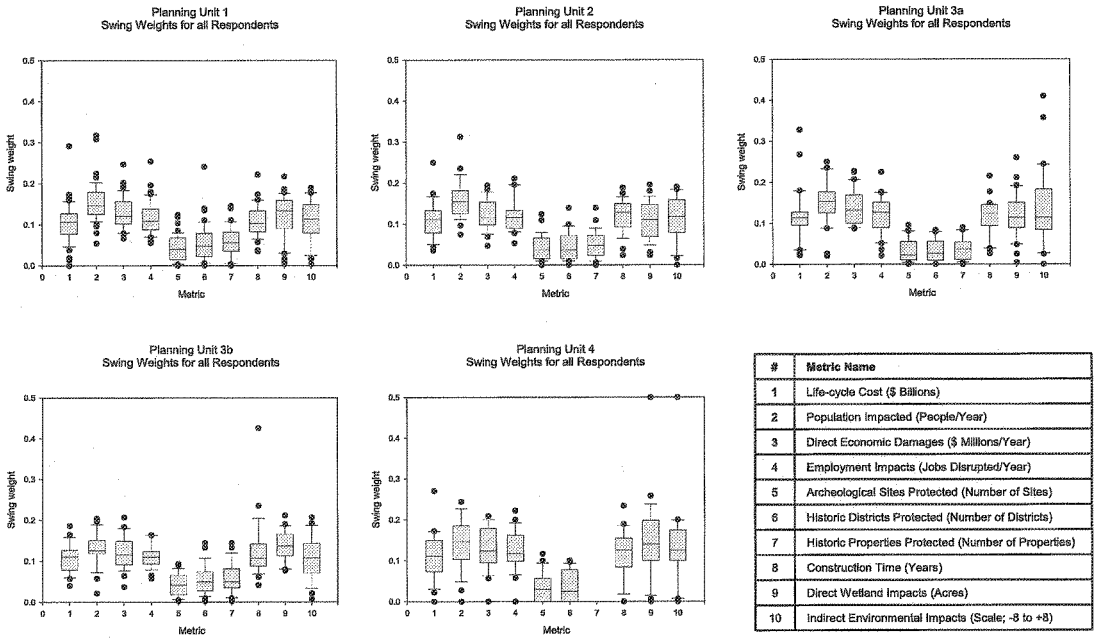
Consistent with the LACPR technical team's plans and recommendations received from the National Academy of Sciences, the swing weight method was used to obtain stakeholder weights. In swing weighting, each survey respondent is shown a hypothetical baseline outcome in which all metrics are evaluated at their worst possible outcome. The participant then considers the possible improvements to these metrics and ranks the metrics to reflect his or her preference for those improvements to the baseline outcome. After ranking the metrics in this manner, the participant then rates each of the possible improvements in terms of their importance relative to the top-ranked metric, which is given a weight of 100. The script presented in Attachment 2

provides additional detail as to how stakeholder preferences were obtained using the swing weight method and illustrates the swing-weight method through a familiar car-buying example. This illustration was presented to each respondent before they began the survey instrument.

The LACPR Technical Team along with Group Solutions facilitated each session. Each participant was provided a dedicated PC to access the survey instrument. An intranet-based system was used to gather preference data from each participant. Group Solutions compiled the resultant data and submitted all results electronically to the LACPR Technical Team for analysis and reporting. The LACPR Technical Team derived weights from survey responses and calculated multi-attribute utility scores to rank plans for each stakeholder. Scores can be used to evaluate measures or plans against the without project condition, as well as to compare the performance of individual measures or plans (see more detailed discussion below).

3. Summary of Stakeholder Weights by Planning Unit

The LACPR weight elicitation sessions yielded 154 complete survey responses (Table 1). The results of weight elicitation are summarized in Figure 1, which shows the distribution of weights on each metric in each planning unit. In Figure 1, the box plots show the distribution of weights on each metric. The lower bound of the box, closest to zero, indicates the 25th percentile of the weight on that metric, the line within the box indicates the median (50th percentile of weights) of that distribution, and the upper bound of the box, furthest from zero, indicates the 75th percentile of the distribution of weights. The whiskers ("error bars") that extend above and below each box indicates the 90th and 10th percentiles. Outliers, those points in the distribution that fall outside the central 80 percent of the weights for each metric, are marked as solid circles. Figure 1 shows that, in most planning units, respondents tended to place more importance on reducing the number people exposed to flood risk (Metric 2) and reducing direct wetland impacts (Metric 9). This tendency is most apparent for PUs 1, 3b, and 4. Respondents also tended to place lower importance on protecting historic districts, properties and archeological sites (Metrics 5, 6 and 7) relative to the other metrics. Although there are some differences among the planning units, a consistent overall pattern is also apparent.



#	Metric Name
1	Life-cycle Cost ($ Billions)
2	Population Impacted (People/Year)
3	Direct Economic Damages ($ Millions/Year)
4	Employment Impacts (Jobs Disrupted/Year)
5	Archeological Sites Protected (Number of Sites)
6	Historic Districts Protected (Number of Districts)
7	Historic Properties Protected (Number of Properties)
8	Construction Time (Years)
9	Direct Wetland Impacts (Acres)
10	Indirect Environmental Impacts (Scale; -8 to +8)

Figure 1: Distribution of Weight Elicitation Results for Each Metric in Each Planning Unit.

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For each respondent, we identified the metric with the highest weight. Table 3 lists, for each metric, the number of survey respondents in each planning unit for which that metric was top-ranked.

Table 3. Top-Ranked Metrics by Planning Unit.

Top-ranked Metric	Planning Unit					Total
	1	2	3a	3b	4	
1. Population impacted (people/year)	21	15	17	8	10	71
2. Residual damages ($, million/year)	3	2	2	3	4	14
3. Life-cycle cost ($, million/year)	1	1	0	1	1	4
4. Construction time (years)	1	1	3	4	1	10
5. Employment impacts (jobs disrupted/year)	2	2	0	2	1	7
6. Indirect environmental impact (unit-less scale, -8 to +8)	8	2	5	2	4	21
7. Direct wetland impacts (acres)	8	4	3	4	6	25
8. Historic properties protected (# of properties)	1	0	0	0	0	1
9. Historic districts protected (# of districts)	0	0	0	1	0	1
10. Archeological sites protected (# of sites)	0	0	0	0	0	0
Number of Survey Respondents	45	27	30	25	27	154

4. Validation of Swing Weights

The validity of swing weights was assessed by testing the ability of the multi-attribute utility function informed by an individual's swing weights to predict that individual's response to a series of ten choice experiments. The choice experiments were administered following the weight elicitation procedure. In a choice experiment, the survey respondent is presented with two possible decision outcomes that vary in terms of the ten LACPR performance metrics under consideration. In these choice experiments, the outcomes presented to respondents were drawn from among the Scenario 1 outcomes projected for the LACPR planning unit for which the survey respondent was providing the swing weights. The accuracy of the multi-attribute utility model is measured as the fraction of choice experiments for which the multi-attribute utility model accurately predicts the respondent's choice. Figure 2 shows a series of box plots illustrating the distribution of accuracy in each planning unit. The lower bound of the box,

closest to zero, indicates the 25th percentile of the accuracy scores in that planning unit, the line within the box indicates the median (50th percentile of weights) of the distribution, and the upper bound of the box, furthest from zero, indicates the 75th percentile of the accuracy scores. The dashed line in each box shows the mean accuracy. The whiskers ("error bars") that extend above and below each box indicates the 10th and 90th percentiles. Outliers, those points in the distribution that fall outside the central 80 percent of the accuracy scores, are marked as solid circles. The mean and median accuracy in each planning unit is between 60 and 70 percent.

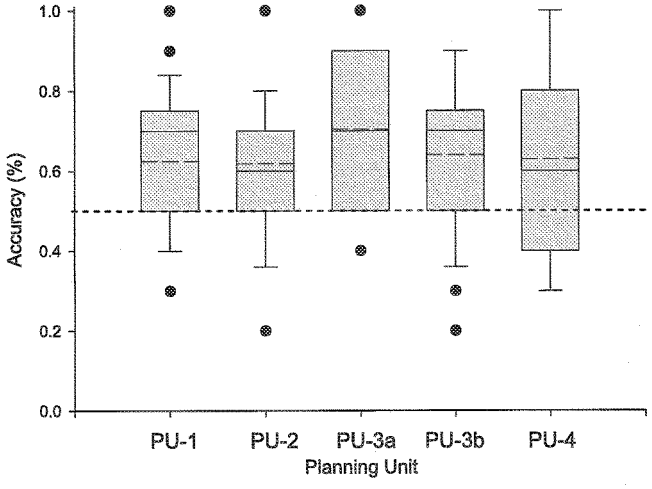

Figure 2. Prediction accuracy of swing weights of 154 LACPR respondents across the five planning units.

5. MCDA Results

The weights obtained from each respondent constitute a preference pattern. These weights are used to calculate a utility score for each plan. The utility score indicates how much "satisfaction" the stakeholder who exhibits that particular preference pattern would derive from the outcome associated with that plan relative to the outcome associated with another plan. These utility

scores provide a convenient means to rank the plans in decreasing order of utility. The top-ranked plan maximizes the stakeholder's utility. The second-ranked plan yields less utility than the top-ranked plan, but the ranking indicates nothing about how much less desirable that plan might be relative to the top-ranked plan. If there is little difference in utility between the two plans, this suggests that either plan would be equally satisfactory to the stakeholder. For many preference patterns, differences in utility among the top several plans appear to be very minor, but this report makes no conclusions about how much more desirable one plan might be relative to another. Our interest is in understanding how frequently a plan appears among the top ranked plans to obtain an indication of how broadly acceptable the candidate plans would be to a diverse group of stakeholders. In this case, that group of stakeholders is characterized by the set of preference patterns elicited from stakeholders who participated in the weight elicitation session. Attachment 5 includes a table showing all of the swing weights that were obtained from each respondent.

This section of the attachment summarizes MCDA results by considering which plans ranked among the top five plans in each planning unit. The five top-ranked plans are always preferred to all of the other plans. We recorded the number of times each plan ranked among the top-five plans in each planning unit and for each scenario. Results are summarized in Tables 4-8. For example, Table 4 contains four sub-tables, one for each scenario. Results for Scenario 1 are shown in the upper left-hand sub-table. All of the plans that ranked among the top five plans for at least one respondent in PU1 for at least one of the four scenarios are listed alphabetically in the left-hand column. The five cells to the right of the plan code give the number of respondents for whom this plan ranked in position one, two, three, four, or five given the scenario. The right-most column gives the total number of times a plan ranked among the top five plans given the scenario. For example, the sub-table for Scenario 1 shows that PU-1-C-HL-a-100-2 never ranked first, second, third, or fourth under sea-level rise conditions and development patterns described for Scenario 1, but did rank fifth under those assumptions for five of the preference patterns obtained from survey respondents in this planning unit. Under Scenario 2 assumptions, this plan ranked fourth for two preference patterns and fifth for six preference patterns. Thus, as shown in the right-hand column of the sub-table for Scenario 2, this plan was ranked among the top five plans a total of eight times under the conditions described for that scenario. If a plan frequently ranks among the top-five plans, it provides a relatively high level of utility for many stakeholders

compared to other plans under consideration. The bottom row of each sub-table shows the number of different preference patterns for which rank positions were tallied.

Results for Planning Unit 1 are summarized in Table 4. In Planning Unit 1, non-structural plans (PU1-NS-100, PU1-NS-400, and PU1-NS-1000) ranked consistently high for almost all of the preference patterns and for all four scenarios. One structural plan (PU-1:C-HL-a-100-3) also ranked relatively high for a large number of preference patterns. One interpretation of these MCDA results is that these particular plans should be afforded further consideration in PU1 because their outcomes are broadly acceptable to a diverse stakeholder group. Not only are these alternatives broadly acceptable, but they are also robust because they yield consistently high level of utility over a diverse set of scenario conditions. Under this interpretation, the analysis helps decision makers to focus in on those plans that are most acceptable. However, more deliberative interpretations are also possible. For example, one might consider whether or not these results are possibly an artifact of considering certain objectives and not others or the way the performance metrics were evaluated. One might also consider whether or not the stakeholders who were engaged in the process represented a sufficiently diverse group of individuals.

Results for the other planning units can be interpreted similarly. Results for Planning Unit 2 are summarized in Table 5. Structural plan PU2-WBI-100-1 stands out as the top-ranked plan for all scenarios. Other structural plans that consistently appear among the top five ranked plans include PU2-C-R-100-2, PU2-C-R-100-3, and PU2-WBI-100-1. In contrast to Planning Unit 1, the non-structural plans ranked relatively low. Results for Planning Unit 3a are summarized in Table 6. These tables show that structural plans (PU3a-C-M-100-2, PU3a-M-100-2) and non-structural plans (PU3a-NS-100, PU3a-NS-400, and PU3a-NS-1000) dominated the rankings for all scenarios. Results for Planning Unit 3b are summarized in Table 7. These tables show that structural plans (PU3b-C-F-100-1, PU3b-C-RL-100-1, and PU3b-F-100-1) tended to dominate the rankings for all four scenarios. However, the frequency with which these plans appear among the top five plans is notably less than in the other planning units. For example, a number of plans (PU3b-C-G-100-1, PU3b-RL-100-1) have a moderately high rate of occurrence among the top five plans. Therefore, the results in this planning unit may be considered somewhat less conclusive. Results for Planning Unit 4 are summarized in Table 8. Both structural plans (PUU4-C-RL-1000-1, PU4-C-RL-400-1) and non-structural plans (PU4-NS-100, PU4-NS-400, and PU4-NS-1000) dominated the ranking.

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Table 4. MCDA results for Planning Unit 1. Each table lists those plans that ranked among the top five ranked plans in PU1 for at least one preference pattern and scenario. Each cell shows the number of times that plan was ranked in each of the top five ranked positions.

PU1, Scenario 1						
PLAN CODE	Rank Based on Swing Weights					Total
	1	2	3	4	5	
PU1-C-HL-a-100-2	0	0	0	0	5	5
PU1-C-HL-a-100-3	0	0	0	10	28	38
PU1-C-HL-b-400-2	1	0	0	3	0	4
PU1-C-LP-a-100-1	0	0	0	3	1	4
PU1-C-LP-a-100-2	0	0	0	0	1	1
PU1-C-LP-b-1000-2	0	0	1	0	0	1
PU1-HL-a-100-2	0	0	0	0	0	0
PU1-HL-a-100-3	0	0	0	1	2	3
PU1-HL-b-400-2	0	1	0	0	2	3
PU1-LP-b-1000-2	0	0	0	1	0	1
PU1-NS-100	16	13	15	0	0	44
PU1-NS-1000	28	6	7	2	0	43
PU1-NS-400	0	23	21	0	0	44
PU1-R2	0	2	1	25	6	34
Total	45	45	45	45	45	225

PU1, Scenario 2						
PLAN CODE	Rank Based on Swing Weights					Total
	1	2	3	4	5	
PU1-C-HL-a-100-2	0	0	0	2	6	8
PU1-C-HL-a-100-3	0	0	0	16	24	40
PU1-C-HL-b-400-2	1	0	0	2	0	3
PU1-C-LP-a-100-1	0	0	0	2	0	2
PU1-C-LP-a-100-2	0	0	0	0	0	0
PU1-C-LP-b-1000-2	0	0	0	0	0	0
PU1-HL-a-100-2	0	0	0	0	1	1
PU1-HL-a-100-3	0	0	0	1	3	4
PU1-HL-b-400-2	0	1	0	0	1	2
PU1-LP-b-1000-2	0	0	0	0	0	0
PU1-NS-100	12	8	24	0	0	44
PU1-NS-1000	32	5	6	1	0	44
PU1-NS-400	0	30	14	0	0	44
PU1-R2	0	1	1	21	10	33
Total	45	45	45	45	45	225

PU1, Scenario 3						
PLAN CODE	Rank Based on Swing Weights					Total
	1	2	3	4	5	
PU1-C-HL-a-100-2	0	1	0	1	4	6
PU1-C-HL-a-100-3	1	2	0	7	29	39
PU1-C-HL-b-400-2	1	0	0	2	0	3
PU1-C-LP-a-100-1	0	1	1	2	1	5
PU1-C-LP-b-1000-2	0	0	1	0	0	1
PU1-C-LP-a-100-2	0	0	0	0	0	0
PU1-HL-a-100-2	0	0	0	0	0	0
PU1-HL-a-100-3	0	0	1	0	5	6
PU1-HL-b-400-2	0	1	0	0	1	2
PU1-LP-b-1000-2	0	0	0	1	0	1
PU1-NS-100	28	2	12	0	0	42
PU1-NS-1000	15	15	5	7	1	43
PU1-NS-400	0	15	24	2	1	42
PU1-R2	0	8	1	23	3	35
Total	45	45	45	45	45	225

PU1, Scenario 4						
PLAN CODE	Rank Based on Swing Weights					Total
	1	2	3	4	5	
PU1-C-HL-a-100-2	0	0	3	1	3	7
PU1-C-HL-a-100-3	0	2	0	9	29	40
PU1-C-HL-b-400-2	1	0	0	2	0	3
PU1-C-LP-a-100-1	0	0	0	1	2	3
PU1-C-LP-b-1000-2	0	0	0	0	0	0
PU1-C-LP-a-100-2	0	0	0	0	1	1
PU1-HL-a-100-2	0	0	0	1	0	1
PU1-HL-a-100-3	0	0	1	0	3	4
PU1-HL-b-400-2	0	1	0	0	1	2
PU1-LP-b-1000-2	0	0	0	0	0	0
PU1-NS-100	24	5	13	1	0	43
PU1-NS-1000	20	14	5	4	0	43
PU1-NS-400	0	21	20	1	1	43
PU1-R2	0	2	3	25	5	35
Total	45	45	45	45	45	225

Table 5. MCDA results for Planning Unit 2. Each table lists those plans that ranked among the top five ranked plans in PU2 for at least one preference pattern and scenario. Each cell shows the number of times that plan was ranked in each of the top five ranked positions.

PU2, Scenario 1						
PLAN CODE	Rank Based on Swing Weights					Total
	1	2	3	4	5	
PU2-C-G-100-1	0	1	2	1	1	5
PU2-C-G-100-4	1	0	1	0	0	2
PU2-C-R-100-2	0	1	13	8	0	22
PU2-C-R-100-3	0	1	2	11	10	24
PU2-C-R-100-4	0	0	0	0	8	8
PU2-C-R-400-2	0	0	0	0	0	0
PU2-C-R-400-3	2	1	4	1	2	10
PU2-C-WBI-100-1	24	1	0	0	0	25
PU2-C-WBI-400-1	0	0	0	0	1	1
PU2-G-100-1	0	0	0	1	0	1
PU2-G-100-4	0	0	1	0	0	1
PU2-NS-1000	0	1	0	0	0	1
PU2-NS-400	0	1	1	0	0	2
PU2-R-100-2	0	0	0	2	5	7
PU2-R-400-3	0	1	0	0	0	1
PU2-WBI-100-1	0	19	3	3	0	25
Total	27	27	27	27	27	135

PU2, Scenario 2						
PLAN CODE	Rank Based on Swing Weights					Total
	1	2	3	4	5	
PU2-C-G-100-1	0	1	2	1	2	6
PU2-C-G-100-4	1	0	1	0	0	2
PU2-C-R-100-2	0	1	9	8	3	21
PU2-C-R-100-3	0	1	5	11	4	21
PU2-C-R-100-4	0	0	0	0	4	4
PU2-C-R-400-2	0	0	0	0	1	1
PU2-C-R-400-3	2	3	3	0	4	12
PU2-C-WBI-100-1	24	1	0	0	0	25
PU2-C-WBI-400-1	0	0	0	1	0	1
PU2-G-100-1	0	0	0	1	1	2
PU2-G-100-4	0	0	1	0	0	1
PU2-NS-1000	0	1	1	0	0	2
PU2-NS-400	0	1	1	1	1	4
PU2-R-100-2	0	0	0	1	5	6
PU2-R-400-3	0	1	0	1	1	3
PU2-WBI-100-1	0	17	4	2	1	24
Total	27	27	27	27	27	135

PU2, Scenario 3						
PLAN CODE	Rank Based on Swing Weights					Total
	1	2	3	4	5	
PU2-C-G-100-1	0	1	2	1	1	5
PU2-C-G-100-4	1	0	1	0	0	2
PU2-C-R-100-2	0	5	14	4	2	25
PU2-C-R-100-3	0	0	2	14	6	22
PU2-C-R-100-4	0	0	0	0	9	9
PU2-C-R-400-2	0	0	0	0	0	0
PU2-C-R-400-3	1	2	2	2	2	9
PU2-C-WBI-100-1	25	0	0	0	0	25
PU2-C-WBI-400-1	0	0	0	0	0	0
PU2-G-100-1	0	0	0	1	1	2
PU2-G-100-4	0	0	1	0	0	1
PU2-NS-1000	0	0	1	0	0	1
PU2-NS-400	0	0	0	1	0	1
PU2-R-100-2	0	0	0	2	5	7
PU2-R-400-3	0	0	1	0	0	1
PU2-WBI-100-1	0	19	3	2	1	25
Total	27	27	27	27	27	135

PU2, Scenario 4						
PLAN CODE	Rank Based on Swing Weights					Total
	1	2	3	4	5	
PU2-C-G-100-1	0	1	2	1	1	5
PU2-C-G-100-4	1	0	1	0	1	3
PU2-C-R-100-2	0	3	14	4	2	23
PU2-C-R-100-3	0	1	2	14	5	22
PU2-C-R-100-4	0	0	0	0	8	8
PU2-C-R-400-2	0	0	0	0	0	0
PU2-C-R-400-3	2	3	2	1	1	9
PU2-C-WBI-100-1	24	1	0	0	0	25
PU2-C-WBI-400-1	0	0	0	0	0	0
PU2-G-100-1	0	0	0	1	1	2
PU2-G-100-4	0	0	1	0	0	1
PU2-NS-1000	0	0	1	0	1	2
PU2-NS-400	0	0	0	1	0	1
PU2-R-100-2	0	0	0	1	6	7
PU2-R-400-3	0	1	0	1	1	3
PU2-WBI-100-1	0	17	4	3	0	24
Total	27	27	27	27	27	135

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Table 6. MCDA results for Planning Unit 3a. Each table lists those plans that ranked among the top five ranked plans in PU3a for at least one preference pattern and scenario. Each cell shows the number of times that plan was ranked in each of the top five ranked positions.

PU3a, Scenario 1						
PLAN CODE	Rank Based on Swing Weights					Total
	1	2	3	4	5	
PU3a-0	2	0	0	2	2	6
PU3a-C-G-1000-2	2	0	1	0	0	3
PU3a-C-G-400-2	0	1	1	0	0	2
PU3a-C-M-100-1	0	2	1	0	1	4
PU3a-C-M-100-2	0	0	3	17	3	23
PU3a-G-1000-2	0	0	0	0	2	2
PU3a-M-100-1	0	0	1	1	1	3
PU3a-M-100-2	0	0	0	3	14	17
PU3a-NS-100	0	1	21	1	3	26
PU3a-NS-1000	26	1	0	0	1	28
PU3a-NS-400	0	25	1	1	0	27
PU3a-R1	0	0	1	5	3	9
Total	30	30	30	30	30	150

PU3a, Scenario 2						
PLAN CODE	Rank Based on Swing Weights					Total
	1	2	3	4	5	
PU3a-0	2	0	0	2	1	5
PU3a-C-G-1000-2	2	1	0	0	0	3
PU3a-C-G-400-2	0	0	2	0	0	2
PU3a-C-M-100-1	0	2	1	0	3	6
PU3a-C-M-100-2	0	0	5	17	3	25
PU3a-G-1000-2	0	0	0	1	1	2
PU3a-M-100-1	0	0	1	1	1	3
PU3a-M-100-2	0	0	0	4	16	20
PU3a-NS-100	0	0	19	3	2	24
PU3a-NS-1000	26	1	1	0	0	28
PU3a-NS-400	0	26	1	0	0	27
PU3a-R1	0	0	0	2	3	5
Total	30	30	30	30	30	150

PU3a, Scenario 3						
PLAN CODE	Rank Based on Swing Weights					Total
	1	2	3	4	5	
PU3a-0	2	0	0	2	3	7
PU3a-C-G-1000-2	2	0	1	0	0	3
PU3a-C-G-400-2	0	1	1	0	0	2
PU3a-C-M-100-1	0	2	0	1	0	3
PU3a-C-M-100-2	0	0	4	16	2	22
PU3a-G-1000-2	0	0	0	0	2	2
PU3a-M-100-1	0	0	1	1	1	3
PU3a-M-100-2	0	0	0	1	14	15
PU3a-NS-100	0	0	22	3	1	26
PU3a-NS-1000	26	1	0	0	1	28
PU3a-NS-400	0	25	1	1	1	28
PU3a-R1	0	1	0	5	5	11
Total	30	30	30	30	30	150

PU3a, Scenario 4						
PLAN CODE	Rank Based on Swing Weights					Total
	1	2	3	4	5	
PU3a-0	2	0	0	2	1	5
PU3a-C-G-1000-2	2	1	0	0	0	3
PU3a-C-G-400-2	0	0	2	0	0	2
PU3a-C-M-100-1	0	2	1	0	0	3
PU3a-C-M-100-2	0	0	3	17	5	25
PU3a-G-1000-2	0	0	0	1	1	2
PU3a-M-100-1	0	0	1	1	1	3
PU3a-M-100-2	0	0	0	3	14	17
PU3a-NS-100	0	0	22	1	3	26
PU3a-NS-1000	26	1	0	1	0	28
PU3a-NS-400	0	26	1	0	1	28
PU3a-R1	0	0	0	4	4	8
Total	30	30	30	30	30	150

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Table 7. The top five ranked plans and the frequency by which these plans were ranked in each of the top five ranked positions for Planning Unit 3b.

PU3b, Scenario 1						
PLAN CODE	Rank Based on Swing Weights					Total
	1	2	3	4	5	
PU3b-C-F-100-1	5	5	7	1	6	24
PU3b-C-F-1000-1	0	0	0	1	0	1
PU3b-C-F-400-1	1	0	3	0	1	5
PU3b-C-G-100-1	6	1	3	1	1	12
PU3b-C-RL-100-1	12	5	2	2	0	21
PU3b-C-RL-400-1	0	0	1	4	6	11
PU3b-F-100-1	0	0	3	8	5	16
PU3b-F-1000-1	0	0	0	0	0	0
PU3b-F-400-1	0	1	0	2	0	3
PU3b-G-100-1	0	6	0	2	2	10
PU3b-NS-100	0	0	0	1	0	1
PU3b-NS-1000	1	2	0	0	3	6
PU3b-NS-400	0	1	1	1	0	3
PU3b-RL-100-1	0	4	5	2	1	12
Total	25	25	25	25	25	125

PU3b, Scenario 2						
PLAN CODE	Rank Based on Swing Weights					Total
	1	2	3	4	5	
PU3b-C-F-100-1	6	5	6	4	3	24
PU3b-C-F-1000-1	0	0	1	0	0	1
PU3b-C-F-400-1	1	0	3	0	4	8
PU3b-C-G-100-1	6	4	1	2	0	13
PU3b-C-RL-100-1	10	4	3	3	1	21
PU3b-C-RL-400-1	0	0	0	0	4	4
PU3b-F-100-1	0	0	4	10	3	17
PU3b-F-1000-1	0	0	0	0	1	1
PU3b-F-400-1	0	1	0	2	1	4
PU3b-G-100-1	0	6	1	1	2	10
PU3b-NS-100	0	0	0	0	1	1
PU3b-NS-1000	2	1	0	1	3	7
PU3b-NS-400	0	1	2	0	0	3
PU3b-RL-100-1	0	3	4	2	2	11
Total	25	25	25	25	25	125

PU3b, Scenario 3						
PLAN CODE	Rank Based on Swing Weights					Total
	1	2	3	4	5	
PU3b-C-F-100-1	4	6	6	2	6	24
PU3b-C-F-1000-1	0	0	0	1	0	1
PU3b-C-F-400-1	1	0	3	0	1	5
PU3b-C-G-100-1	6	1	2	2	1	12
PU3b-C-RL-100-1	13	5	2	1	0	21
PU3b-C-RL-400-1	0	0	1	3	7	11
PU3b-F-100-1	0	0	4	9	3	16
PU3b-F-1000-1	0	0	0	0	0	0
PU3b-F-400-1	0	1	0	2	0	3
PU3b-G-100-1	0	6	0	1	1	8
PU3b-NS-100	0	0	0	1	0	1
PU3b-NS-1000	0	0	1	2	2	5
PU3b-NS-400	1	0	2	0	1	4
PU3b-RL-100-1	0	6	4	1	3	14
Total	25	25	25	25	25	125

PU3b, Scenario 4						
PLAN CODE	Rank Based on Swing Weights					Total
	1	2	3	4	5	
PU3b-C-F-100-1	5	6	6	4	3	24
PU3b-C-F-1000-1	0	0	1	0	0	1
PU3b-C-F-400-1	1	0	3	1	3	8
PU3b-C-G-100-1	6	2	1	3	1	13
PU3b-C-RL-100-1	12	4	2	2	1	21
PU3b-C-RL-400-1	0	0	0	0	4	4
PU3b-F-100-1	0	0	5	10	2	17
PU3b-F-1000-1	0	0	0	0	1	1
PU3b-F-400-1	0	1	0	2	1	4
PU3b-G-100-1	0	6	0	1	3	10
PU3b-NS-100	0	0	0	0	1	1
PU3b-NS-1000	1	2	0	0	3	6
PU3b-NS-400	0	1	2	0	1	4
PU3b-RL-100-1	0	3	5	2	1	11
Total	25	25	25	25	25	125

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Table 8. The top five ranked plans and the frequency by which these plans were ranked in each of the top five ranked positions for Planning Unit 4.

PU4, Scenario 1						
	Rank Based on Swing Weights					Total
PLAN CODE	1	2	3	4	5	
PU4-0	0	0	1	0	0	1
PU4-C-G-100-1	0	1	0	0	0	1
PU4-C-G-100-2	0	0	0	1	0	1
PU4-C-G-1000-3	1	0	0	0	0	1
PU4-C-G-400-3	0	0	1	0	0	1
PU4-C-RL-100-1	3	3	0	1	5	12
PU4-C-RL-1000-1	0	1	0	2	14	17
PU4-C-RL-400-1	6	3	6	10	0	25
PU4-NS-100	0	1	9	7	5	22
PU4-NS-1000	15	3	7	1	1	27
PU4-NS-400	1	14	6	4	1	26
PU4-R1	0	0	1	0	0	1
Total	26	26	31	26	26	135

PU4, Scenario 2						
	Rank Based on Swing Weights					Total
PLAN CODE	1	2	3	4	5	
PU4-0	0	0	1	0	0	1
PU4-C-G-100-1	0	1	0	0	0	1
PU4-C-G-100-2	0	0	0	1	0	1
PU4-C-G-1000-3	1	0	0	0	0	1
PU4-C-G-400-3	0	0	1	0	0	1
PU4-C-RL-100-1	2	2	1	2	4	11
PU4-C-RL-1000-1	0	0	2	10	7	19
PU4-C-RL-400-1	2	3	9	2	9	25
PU4-NS-100	0	0	10	6	5	21
PU4-NS-1000	20	3	2	1	1	27
PU4-NS-400	1	17	4	4	0	26
PU4-R1	0	0	1	0	0	1
Total	26	26	31	26	26	135

PU4, Scenario 3						
	Rank Based on Swing Weights					Total
PLAN CODE	1	2	3	4	5	
PU4-0	0	0	1	0	0	1
PU4-C-G-100-1	0	1	0	0	0	1
PU4-C-G-100-2	0	0	0	1	0	1
PU4-C-G-1000-3	1	0	0	0	0	1
PU4-C-G-400-3	0	0	1	0	0	1
PU4-C-RL-100-1	3	1	2	2	4	12
PU4-C-RL-1000-1	0	0	1	2	14	17
PU4-C-RL-400-1	3	2	6	12	2	25
PU4-NS-100	0	1	11	5	5	22
PU4-NS-1000	16	4	5	1	1	27
PU4-NS-400	3	17	3	3	0	26
PU4-R1	0	0	1	0	0	1
Total	26	26	31	26	26	135

PU4, Scenario 4						
	Rank Based on Swing Weights					Total
PLAN CODE	1	2	3	4	5	
PU4-0	0	0	1	0	0	1
PU4-C-G-100-1	0	1	0	0	0	1
PU4-C-G-100-2	0	0	0	1	0	1
PU4-C-G-1000-3	1	0	0	0	0	1
PU4-C-G-400-3	0	0	1	0	0	1
PU4-C-RL-100-1	2	0	2	3	4	11
PU4-C-RL-1000-1	0	0	1	11	7	19
PU4-C-RL-400-1	0	1	3	11	10	25
PU4-NS-100	0	0	17	0	4	21
PU4-NS-1000	21	3	2	0	1	27
PU4-NS-400	2	21	3	0	0	26
PU4-R1	0	0	1	0	0	1
Total	26	26	31	26	26	135

NOTE: The total number of plans ranked third is 31 because, for one respondent, the five top-ranked plans all have the same utility. There were 27 survey responses in PU4.

6. Illustrative Preference Patterns

The remainder of this discussion of MCDA results explores what differences exist in the preference patterns expressed by individual respondents. In each planning unit, three illustrative preference patterns are selected from among the survey responses. No generalizations or conclusions are drawn from these results. These preference patterns have been selected to highlight what differences exist among individual stakeholders in each planning unit, not because they represent the average stakeholder or a "typical" preference pattern. No conclusions are made here about what preference patterns are most common among stakeholders that participated in the preference assessment or how well these preference patterns represent those of stakeholders who did not participate in the preference assessment. These results are illustrative in the sense that they are presented simply to illustrate how different sets of weights can lead to different conclusions about which alternative is preferred.

In the results that follow, MAU scores are evaluated for each coastal, structural and nonstructural plan and the no-action alternative in each planning unit using the illustrative stakeholder weights from that planning unit. The alternatives are then ranked by the MAU score for each of four planning scenarios. The plan with the highest MAU score is the "preferred" alternative given the scenarios and preferences under consideration. However, as noted in Section 5, care should be taken not to ascribe too much importance to identifying the top-ranked plan. The interest should be in developing a more comprehensive understanding about which alternatives rank relatively high, which rank relatively low, and which alternatives might represent consensus plans because they are acceptable to a large number of stakeholders with diverse preferences. Therefore, rather than focusing on identifying the top-ranked plan and choosing this as the "best" alternative, it may be more useful to consider other types of questions. For example:

- How much do the MAU scores vary across the alternatives?
- Is there a group of plans at the top that have MAU scores that are relatively close to one another? What are the similarities and differences of the plans that form this "top tier?"
- How sensitive are plan rankings to planning assumptions and stakeholder preferences?
- Do stakeholders with different preference patterns prefer one particular plan but for different reasons?

Results of the analysis are presented in the form of numerous tables and graphs that summarize the results for each planning unit so that they can be used to support these types of deliberations among decision makers and stakeholders.

6.1 Introduction to the Presentation of Illustrative MCDA Results

The purpose of this introduction to the results is to familiarize the reader with the several different presentation formats and facilitate the discussion of results for each planning unit in the next several sections. Results are presented for each scenario and illustrative preference pattern using six types of tables and figures, including:

1. tables showing plans ranked by their MAU score;
2. figures showing the contribution of each metric to the MAU score;
3. tables showing the plan that maximizes the MAU score;
4. figures showing an expected MAU score and its range; and
5. figures showing the sensitivity of an MCDA that maximizes expected utility.

1. **Tables Showing Plans Ranked by their MAU Score**: In this presentation format, the plans are ranked by MAU score shown in Figure 3. There is one table for each of the characteristic set of preferences (Preference Pattern A, etc.) as indicated in the upper left-hand corner of each table. The table includes four rankings, one for each planning scenario. The scenarios are described in Table 2 in Section 3.2 of the main RIDF Appendix. For each scenario, the first column lists the plan number (provided for each planning unit in the following presentation of results) and the LACPR plan code with which it is associated. The MAU score in the third column is a measure of the utility of each alternative and takes a value between zero and one. As described in Section 3.5.1 of the main RIDF Appendix, MAU is the weighted sum of scaled performance metrics, where the weights reflect one of the three characteristic preference patterns identified among the stakeholders who participated in the weight elicitation exercises. This type of analysis, in which alternatives are ranked within each planning unit by a deterministic utility score, is replicated for each of the four scenarios representing possible, but uncertain, future conditions that might affect performance.

PU-1: A

Scenario 1		
Plan	Plan Code	Utility
19	PU1-C-HL-b-400-2	0.725
8	PU1-HL-b-400-2	0.717
3	PU1-NS-100	0.698
4	PU1-NS-400	0.691
5	PU1-NS-1000	0.689
17	PU1-C-HL-a-100-2	0.689
6	PU1-HL-a-100-2	0.683
27	PU1-C-LP-b-1000-2	0.681
18	PU1-C-HL-a-100-3	0.678
16	PU1-LP-b-1000-2	0.673
22	PU1-C-LP-a-100-2	0.672
7	PU1-HL-a-100-3	0.671
21	PU1-C-LP-a-100-1	0.671
20	PU1-C-HL-b-400-3	0.667
11	PU1-LP-a-100-2	0.664
10	PU1-LP-a-100-1	0.659
9	PU1-HL-b-400-3	0.658
2	PU1-R2	0.657
23	PU1-C-LP-a-100-3	0.655
25	PU1-C-LP-b-400-3	0.654
24	PU1-C-LP-b-400-1	0.653
12	PU1-LP-a-100-3	0.646
14	PU1-LP-b-400-3	0.645
13	PU1-LP-b-400-1	0.640
26	PU1-C-LP-b-1000-1	0.637
15	PU1-LP-b-1000-1	0.623
1	PU1-0	0.526

Scenario 2		
Plan	Plan Code	Utility
19	PU1-C-HL-b-400-2	0.674
3	PU1-NS-100	0.669
4	PU1-NS-400	0.668
5	PU1-NS-1000	0.666
8	PU1-HL-b-400-2	0.665
17	PU1-C-HL-a-100-2	0.655
6	PU1-HL-a-100-2	0.649
18	PU1-C-HL-a-100-3	0.642
7	PU1-HL-a-100-3	0.634
20	PU1-C-HL-b-400-3	0.628
22	PU1-C-LP-a-100-2	0.625
21	PU1-C-LP-a-100-1	0.623
2	PU1-R2	0.617
24	PU1-C-LP-b-400-1	0.617
9	PU1-HL-b-400-3	0.617
11	PU1-LP-a-100-2	0.617
10	PU1-LP-a-100-1	0.610
23	PU1-C-LP-a-100-3	0.606
25	PU1-C-LP-b-400-3	0.606
13	PU1-LP-b-400-1	0.602
12	PU1-LP-a-100-3	0.598
14	PU1-LP-b-400-3	0.596
26	PU1-C-LP-b-1000-1	0.593
15	PU1-LP-b-1000-1	0.576
27	PU1-C-LP-b-1000-2	0.532
16	PU1-LP-b-1000-2	0.523
1	PU1-0	0.447

Scenario 3		
Plan	Plan Code	Utility
19	PU1-C-HL-b-400-2	0.739
8	PU1-HL-b-400-2	0.733
3	PU1-NS-100	0.706
17	PU1-C-HL-a-100-2	0.705
6	PU1-HL-a-100-2	0.700
18	PU1-C-HL-a-100-3	0.695
27	PU1-C-LP-b-1000-2	0.694
4	PU1-NS-400	0.691
7	PU1-HL-a-100-3	0.689
16	PU1-LP-b-1000-2	0.689
5	PU1-NS-1000	0.688
21	PU1-C-LP-a-100-1	0.686
22	PU1-C-LP-a-100-2	0.686
11	PU1-LP-a-100-2	0.681
20	PU1-C-HL-b-400-3	0.681
2	PU1-R2	0.677
10	PU1-LP-a-100-1	0.677
9	PU1-HL-b-400-3	0.674
23	PU1-C-LP-a-100-3	0.669
25	PU1-C-LP-b-400-3	0.667
24	PU1-C-LP-b-400-1	0.665
12	PU1-LP-a-100-3	0.664
14	PU1-LP-b-400-3	0.661
13	PU1-LP-b-400-1	0.657
26	PU1-C-LP-b-1000-1	0.646
15	PU1-LP-b-1000-1	0.640
1	PU1-0	0.556

Scenario 4		
Plan	Plan Code	Utility
19	PU1-C-HL-b-400-2	0.692
8	PU1-HL-b-400-2	0.686
3	PU1-NS-100	0.676
17	PU1-C-HL-a-100-2	0.676
6	PU1-HL-a-100-2	0.670
4	PU1-NS-400	0.668
5	PU1-NS-1000	0.666
18	PU1-C-HL-a-100-3	0.662
7	PU1-HL-a-100-3	0.656
20	PU1-C-HL-b-400-3	0.646
21	PU1-C-LP-a-100-1	0.643
22	PU1-C-LP-a-100-2	0.643
2	PU1-R2	0.643
9	PU1-HL-b-400-3	0.639
11	PU1-LP-a-100-2	0.638
24	PU1-C-LP-b-400-1	0.634
10	PU1-LP-a-100-1	0.633
23	PU1-C-LP-a-100-3	0.625
13	PU1-LP-b-400-1	0.625
25	PU1-C-LP-b-400-3	0.623
12	PU1-LP-a-100-3	0.620
14	PU1-LP-b-400-3	0.617
26	PU1-C-LP-b-1000-1	0.607
15	PU1-LP-b-1000-1	0.599
27	PU1-C-LP-b-1000-2	0.549
16	PU1-LP-b-1000-2	0.544
1	PU1-0	0.492

Figure 3. Illustrative Example of Table: *Plans Ranked by MAU Score for Planning Unit and Preference Pattern.*

2. **Figures Showing the Contribution of Each Metric to the MAU Score:** Figure 4 illustrates how much of the MAU score can be attributed to performance on each metric. The numbers and abbreviations for these metrics are shown in Table 9. Plans are shown ranked from left to right in terms of decreasing MAU score. The color coding of the bars shows the relative contribution of each metric to the MAU score. Although a plan may perform well on an objective, a stakeholder who places little or no weight on that objective will derive little or no utility from that aspect of performance. In this case, there will be little or no contribution of a metric to the MAU score and the color-coded metric may be difficult to see in this figure. In some cases, a metric may show consistently high performance on an objective for all plans. This demonstrates another point to consider when interpreting plan rankings. Although a metric contributes to the MAU score, it may have little or no impact on plan rankings if there is not much variation in the performance on that metric across the decision alternatives. Although stakeholders derive utility from the outcome, performance on that objective will have little or not impact on the decision.

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Table 9. Metric Numbers, Names and Abbreviations.

Metric	Metric Name	Abbreviation
1	Life-cycle Cost ($ Billions)	COST
2	Population Impacted (People/Year)	POP
3	Direct Economic Damages ($ Millions/Year)	DAM
4	Employment Impacts (Jobs Disrupted/Year)	EMP
5	Archeological Sites Protected (Number of Sites)	ASIT
6	Historic Properties Protected (Number of Properties)	HPRO
7	Historic Districts Protected (Number of Districts)	HDIS
8	Construction Time (Years)	TIME
9	Direct Wetland Impacts (Acres)	DWI
10	Indirect Environmental Impacts (Unitless Scale; -8 to +8)	IEI

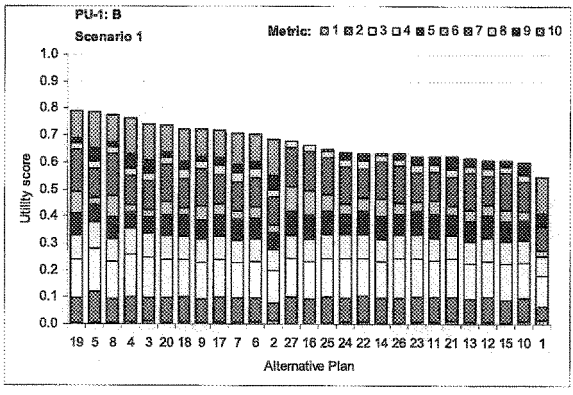


Figure 4. Illustrative Example of the Figure: *Contributions of Metrics to the MAU Score.*

3. **Tables Showing the Plan that Maximizes the MAU Score**: This table illustrates the sensitivity of the decision to the planning assumptions for each preference pattern (see Figure 5 example). No information is being presented in this table that has not been previously presented above, but in some ways these tables make it is easier to assess sensitivity.

PU-1: A	Relative Sea-level Rise	
Pattern of Development	Lower	Higher
High/Dispersed	PU1-NS-100	PU1-NS-100
BAU/Compact	PU1-NS-100	PU1-NS-100

PU-1: B	Relative Sea-level Rise	
Pattern of Development	Lower	Higher
High/Dispersed	PU1-NS-1000	PU1-NS-1000
BAU/Compact	PU1-NS-1000	PU1-NS-1000

PU-1: C	Relative Sea-level Rise	
Pattern of Development	Lower	Higher
High/Dispersed	PU1-C-HL-b-400-2	PU1-C-HL-b-400-2
BAU/Compact	PU1-C-HL-b-400-2	PU1-C-HL-b-400-2

Figure 5. Illustrative Example of the Table: *Table of Preferred Plans.*

4. **Figures Showing the Expected MAU Score and Range**: In a decision analysis with uncertainty, the preferred alternative is the one that maximizes expected utility. This type of figure is illustrated in Figure 6 which plots the expected utility of each alternative for a hypothetical allocation of probability to each of the two relative sea level rise scenarios for one of the preference patterns. In this analysis, we calculate expected utility for each of the development scenarios treating relative sea level rise (RSLR) as uncertain. Figure 6 illustrates how the utility of some alternatives may be more or less sensitive to relative sea level rise assumptions than the utility of other alternatives. The error bands on expected utility represent the minimum and maximum levels of utility over the four scenarios considered in this analysis. Alternatives that are more sensitive to relative sea level rise and development assumptions will have larger error bands. Alternatives that are less sensitive to those assumptions have narrow error bands. These alternatives may be preferred to those that have larger ranges because these alternatives lead to decision outcomes that are less uncertain.

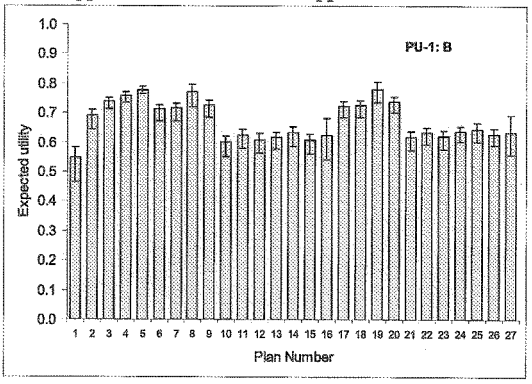


Figure 6. Illustrative Example of Figure: *Expected Utility of each Plan showing minimum and maximum utility scores. (Scenarios 1 & 2: High Employment/ Dispersed Population).*

5. **Figures Showing the Sensitivity of an MCDA that Maximizes Expected Utility:** This figure shows how the decision changes in response to the distribution of probabilities across the relative sea level rise scenarios given the two development scenarios. In this figure (see Figure 7 example), each cell indicates what plan (by plan number) maximizes expected utility for the indicated preferences. Although a decision maker may not have precise knowledge about the probabilities associated with the scenarios, it is still possible to inform a decision by thinking in less precise terms and characterizing the decision landscape.

PU-1: C	Probability (RSLR = Higher)										
Development Scenario	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
High Employment/ Dispersed Population (Scenarios 1&2)	5	5	5	5	5	5	5	5	5	5	5
BAU Employment/Compact Population (Scenarios 3&4)	3	3	3	3	3	3	5	5	5	5	5

Figure 7. Illustrative Example of Figure: *Sensitivity of an MCDA that Maximizes Expected Utility.*

6.2 Results for Illustrative Preference Patterns – Planning Unit 1

The illustrative preference patterns are assigned the labels PU-1:A, PU-1:B, and PU-1:C. Table 10 lists the weights for each preference pattern and Figure 8 displays the weights in a graphical format. PU-1:A has the highest weight on minimizing direct wetland impacts (DWI) and reducing direct economic damages (DAM). PU-1:A also has a high weight on reducing the length of time to construct a hurricane protection system (TIME), and maximizing the number of historic properties protected (HPRO). PU-1:A places relatively little importance on minimizing life-cycle project costs (COST). PU-1:B has the highest weight on minimizing direct wetland impacts (DWI) and indirect environmental impacts (IEI) and the lowest weight on the archeological sites, historic properties, and historic districts protected objectives (ASIT, HPRO, and HDIS). PU-1:B weights potential improvements with respect to other objectives (COST, POP, DAM, EMP, and TIME) more or less evenly. PU-1:C put the highest weight on minimizing population impacts (POP), but also places a high importance on minimizing employment impacts (EMP). PU-1:C also places a relatively high weight on the other social effect objectives.

Table 10. Swing weights for three illustrative preference patterns discussed for PU1.

#	Code	Name	PU-1:A	PU-1:B	PU-1:C
1	COST	Life-cycle Cost ($ Billions)	0.0135	0.1032	0.0775
2	POP	Population Impacted (People/Year)	0.1012	0.1190	0.1550
3	DAM	Direct Economic Damages ($ Millions/Year)	0.1686	0.1032	0.0775
4	EMP	Employment Impacts (Jobs Disrupted/Year)	0.1012	0.1190	0.1473
5	ASIT	Archeological Sites Protected (Number of Sites)	0.0337	0.0476	0.1240
6	HDIS	Historic Districts Protected (Number of Districts)	0.1349	0.0476	0.1395
7	HPRO	Historic Properties Protected (Number of Properties)	0.0506	0.0397	0.1395
8	TIME	Construction Time (Years)	0.1349	0.1032	0.0930
9	DWI	Direct Wetland Impacts (Acres)	0.1686	0.1587	0.0310
10	IEI	Indirect Environmental Impacts (Scale; -8 to +8)	0.0927	0.1587	0.0155
		Top-ranked metric	DWI, DAM	IEI, DWI	POP

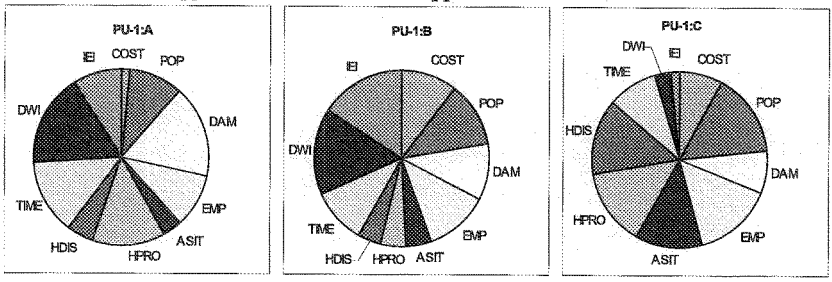
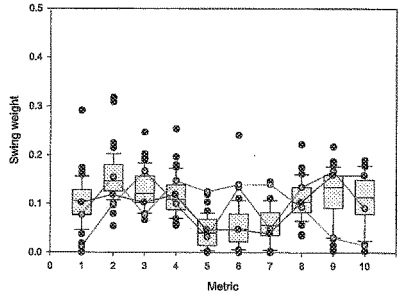


Figure 8. Three illustrative preference patterns discussed for PU1.

The illustrative preference patterns selected for discussion here are each unique within the planning unit, but they are not necessarily atypical. Usually, a preference pattern contains some weights that are similar to those of other stakeholders and some weights that represent extremes. Figure 9 shows how each of the swing weights in the illustrative preference pattern compares to the other swing weights in this planning unit. In this figure, the three color-coded sets of weights are overlaid on the box plots that were introduced in Section 3. The closer each of the color-coded points is to being within the gray box for a particular performance measure, the more typical the weight. Points that fall outside the error bars that surround the gray box indicate extreme positions relative to other survey respondents, or outliers. For example, illustrative preference pattern PU-1:A is color coded red. The weights for metric 1 (COST) and metric 2 (POP) are below the error bars in the box plot; therefore, these are uncharacteristically low. The weight on metric 6 (HDIS) is uncharacteristically high. Of all the three illustrative preference patterns considered here, PU-1:B weights appears to be most similar to others in the planning unit. PU-1:C has unusually high weights on metrics 5 (ASIT), metric 6 (HDIS), and 7 (HPRO) and unusually low weights on metric 9 (DWI) and metric 10 (IEI).



#	Code	Metric Name
1	COST	Life-cycle Cost ($ Billions)
2	POP	Population Impacted (People/Year)
3	DAM	Direct Economic Damages ($ Millions/Year)
4	EMP	Employment Impacts (Jobs Disrupted/Year)
5	ASIT	Archeological Sites Protected (Number of Sites)
6	HDIS	Historic Districts Protected (Number of Districts)
7	HPRO	Historic Properties Protected (Number of Properties)
8	TIME	Construction Time (Years)
9	DWI	Direct Wetland Impacts (Acres)
10	IEI	Indirect Environmental Impacts (Scale; -8 to +8)

Figure 9. Swing weights for the three preference patterns evaluated for PU1 superimposed on the swing weight box plot (previously introduced in Section 3). See Table 10 for explanation of how the metrics are numbered. The preference patterns are color coded as follows: PU-1:A is red, PU-1:B is blue, and PU-1:C is green.

These three illustrative preference patterns produce a unique rank order of plans. These rank orders are illustrated in Figure 10 for each of the preference patterns. The underlying table was introduced in Section 5 and shows the number of times that each plan ranked first, second, third, fourth, or fifth when plans were ranked in decreasing order by the utility score. For PU-1:A, the top five plans are marked in red: PU1-NS-1000, PU1-NS-400, PU1-NS-100, PU1-C-HL-a-100-3, and PU1-R2. For PU-1:B, the top five plans are marked in blue: PU1-NS-100, PU1-NS-1000, PU1-NS-400, PU1-R2, and PU1-C-HL-a-100-3. For PU-1:C, the top five plans are marked in green and all of the top five plans are structural. These results are presented here to illustrate that different sets of weights lead to different rankings of plans. While the rankings suggest order of preference, they do not indicate how much more or less preferred a plan is relative to other plans. In addition, these figures do not help explain why a particular set of weights leads to a particular ranking of plans. These issues are discussed in greater detail below.

PU1, Scenario 1						
PLAN CODE	Rank Based on Swing Weights					Total
	1	2	3	4	5	
PU1-C-HL-a-100-2	0	0	0	0	5	5
PU1-C-HL-a-100-3	0	0	0	10	28	38
PU1-C-HL-b-400-2	1	0	0	3	0	4
PU1-C-LP-a-100-1	0	0	0	3	1	4
PU1-C-LP-a-100-2	0	0	0	0	1	1
PU1-C-LP-b-1000-2	0	0	1	0	0	1
PU1-HL-a-100-2	0	0	0	0	0	0
PU1-HL-a-100-3	0	0	0	1	2	3
PU1-HL-b-400-2	0	1	0	0	2	3
PU1-LP-b-1000-2	0	0	0	1	0	1
PU1-NS-100	16	13	15	0	0	44
PU1-NS-1000	28	6	7	2	0	43
PU1-NS-400	0	23	21	0	0	44
PU1-R2	0	2	1	25	6	34
Total	45	45	45	45	45	225

Figure 10. Rank order of the top five plans for the illustrative preference patterns. The preference patterns are color coded as follows: PU-1:A is red, PU-1:B is blue, and PU-1:C is green.

In the discussion of PU-1 results that follows, plans are numbered 1-27 to facilitate references in tables and figures (Table 11). Plans are ranked by MAU for each planning scenario and characteristic sets of preferences in Tables 12 through 14.

Table 11. Plan Numbers and Plan Names for PU1.

Plan	*Plan Code*
1	PU1-0
2	PU1-R2
3	PU1-NS-100
4	PU1-NS-400
5	PU1-NS-1000
6	PU1-HL-a-100-2
7	PU1-HL-a-100-3
8	PU1-HL-b-400-2
9	PU1-HL-b-400-3
10	PU1-LP-a-100-1
11	PU1-LP-a-100-2
12	PU1-LP-a-100-3
13	PU1-LP-b-400-1
14	PU1-LP-b-400-3
15	PU1-LP-b-1000-1
16	PU1-LP-b-1000-2
17	PU1-C-HL-a-100-2
18	PU1-C-HL-a-100-3
19	PU1-C-HL-b-400-2
20	PU1-C-HL-b-400-3
21	PU1-C-LP-a-100-1
22	PU1-C-LP-a-100-2
23	PU1-C-LP-a-100-3
24	PU1-C-LP-b-400-1
25	PU1-C-LP-b-400-3
26	PU1-C-LP-b-1000-1
27	PU1-C-LP-b-1000-2

The 27 plans are ranked by MAU for each scenario and each of the three preference patterns in Tables 12 through 14. For example, Table 13 shows the utility of Plan 5 for PU-1:B under the planning assumptions used in Scenarios 1 and 3 is 0.806 and 0.807, respectively. Under the assumptions of Scenario 2 and 4, Plan 5 remains the top-ranked plan, but the utility score

decreases to 0.793 and 0.795, respectively. The lower-levels of performance for this plan in Scenarios 2 and 4 can be attributed to the higher rates of sea-level rise assumed in these scenarios. For preference pattern PU-1:C, the effect of higher rates of sea-level rise is to make a 400-year structural plan (PU1-C-HL-b-400-2) more attractive than the non-structural plan. This shows sensitivity of the preferred plan to uncertainty in sea-level rise assumptions. For PU-1:A and PU-1:B, non-structural plans dominate the rankings under all four scenarios.

Figures 11 through 13 illustrate why different preference patterns might lead to different plan rankings by showing the contribution of each metric to utility for each plan, scenario, and preference pattern. For example, Figure 11 illustrates the contribution of each metric to utility for PU-1:A. Under a set of planning assumptions consistent with Scenario 1 (Lower RSLR and High Employment/Dispersed Population), the utility of Plan 3 for PU-1:A is 0.808. This can be attributed to the relative performance of this plan on those performance objectives that are important for this preference pattern. Although a plan may contribute substantially towards one of the performance objectives, if the weights reflect relatively little importance on that objective, the performance with respect to that objective will make little contribution towards the overall utility for this preference pattern.

For PU-1:A, the top-ranked plan is one that includes non-structural measures: Plans 3, 5 and 4 (Table 12 and Figure 11). For this preference pattern, the rank order of the top three plans is not dependent upon scenario assumptions. Metrics most contributing to the MAU scores for PU-1:A were direct wetland impacts (No. 9) and indirect environmental impacts (No. 10). Although a particular metric may make substantial contributions toward overall utility, performance metrics that do not vary among decision alternatives will tend to have little impact on plan rankings. This holds true for direct economic damages (No. 3) and employment impacts (No. 4). Although these metrics contribute to the MAU score, they have little influence on the ranking of structural and nonstructural alternatives because they do not vary. Metrics most influencing overall utility for Plans 3, 5 and 4 are direct wetland impacts and indirect environmental impacts (Nos. 9 and 10).

For PU-1:B, the three top-ranking plans are those that include nonstructural measures: Plans 5, 4 and 3 (Table 13 and Figure 12). For this group, the rank order of the top three plans is not dependent upon scenario assumptions. Metrics most contributing to the MAU scores for

Preference Pattern C were direct wetland impacts (No. 9) and indirect environmental impacts (No. 10).

The top ranking plans for PU-1:C are those that include both comprehensive (contains both structural and non-structural measures; Plan 19) and structural plans (Plan 8) (Table 14 and Figure 13) which have structural plans in common. The rank order for these plans was not sensitive to scenario assumptions. The metrics most contributing to MAU of the comprehensive plan (Plan 19) were historic districts protected (No. 7), direct wetland impacts (No. 9) and indirect environmental impacts (No. 10). The metrics most contributing to MAU of the structural plan (Plan 8) were protection of historic districts (No. 7), direct wetland impacts (No. 9) and indirect environmental impacts (No. 10).

Table 12. Plans Ranked by Multi-attribute Utility Score for PU-1, Preference Pattern A.

PU-1: A

	Scenario 1	
Plan	*Plan Code*	*Utility*
3	PU1-NS-100	0.808
5	PU1-NS-1000	0.802
4	PU1-NS-400	0.799
2	PU1-R2	0.767
18	PU1-C-HL-a-100-3	0.747
7	PU1-HL-a-100-3	0.740
17	PU1-C-HL-a-100-2	0.721
6	PU1-HL-a-100-2	0.715
19	PU1-C-HL-b-400-2	0.654
8	PU1-HL-b-400-2	0.646
20	PU1-C-HL-b-400-3	0.646
21	PU1-C-LP-a-100-1	0.641
1	PU1-0	0.638
9	PU1-HL-b-400-3	0.637
10	PU1-LP-a-100-1	0.630
23	PU1-C-LP-a-100-3	0.595
22	PU1-C-LP-a-100-2	0.595
12	PU1-LP-a-100-3	0.588
11	PU1-LP-a-100-2	0.588
24	PU1-C-LP-b-400-1	0.564
13	PU1-LP-b-400-1	0.553
26	PU1-C-LP-b-1000-1	0.541
15	PU1-LP-b-1000-1	0.529
25	PU1-C-LP-b-400-3	0.510
14	PU1-LP-b-400-3	0.501
27	PU1-C-LP-b-1000-2	0.482
16	PU1-LP-b-1000-2	0.474

	Scenario 2	
Plan	*Plan Code*	*Utility*
3	PU1-NS-100	0.793
5	PU1-NS-1000	0.792
4	PU1-NS-400	0.788
2	PU1-R2	0.743
18	PU1-C-HL-a-100-3	0.728
7	PU1-HL-a-100-3	0.720
17	PU1-C-HL-a-100-2	0.704
6	PU1-HL-a-100-2	0.698
19	PU1-C-HL-b-400-2	0.628
20	PU1-C-HL-b-400-3	0.626
8	PU1-HL-b-400-2	0.619
9	PU1-HL-b-400-3	0.616
21	PU1-C-LP-a-100-1	0.615
10	PU1-LP-a-100-1	0.604
1	PU1-0	0.579
22	PU1-C-LP-a-100-2	0.573
23	PU1-C-LP-a-100-3	0.572
11	PU1-LP-a-100-2	0.566
12	PU1-LP-a-100-3	0.564
24	PU1-C-LP-b-400-1	0.545
13	PU1-LP-b-400-1	0.532
26	PU1-C-LP-b-1000-1	0.516
15	PU1-LP-b-1000-1	0.501
25	PU1-C-LP-b-400-3	0.485
14	PU1-LP-b-400-3	0.476
27	PU1-C-LP-b-1000-2	0.431
16	PU1-LP-b-1000-2	0.422

	Scenario 3	
Plan	*Plan Code*	*Utility*
3	PU1-NS-100	0.818
5	PU1-NS-1000	0.802
4	PU1-NS-400	0.801
2	PU1-R2	0.793
18	PU1-C-HL-a-100-3	0.768
7	PU1-HL-a-100-3	0.762
17	PU1-C-HL-a-100-2	0.742
6	PU1-HL-a-100-2	0.737
1	PU1-0	0.672
19	PU1-C-HL-b-400-2	0.672
8	PU1-HL-b-400-2	0.666
20	PU1-C-HL-b-400-3	0.664
21	PU1-C-LP-a-100-1	0.660
9	PU1-HL-b-400-3	0.658
10	PU1-LP-a-100-1	0.652
23	PU1-C-LP-a-100-3	0.614
22	PU1-C-LP-a-100-2	0.613
12	PU1-LP-a-100-3	0.609
11	PU1-LP-a-100-2	0.609
24	PU1-C-LP-b-400-1	0.580
13	PU1-LP-b-400-1	0.574
26	PU1-C-LP-b-1000-1	0.554
15	PU1-LP-b-1000-1	0.549
25	PU1-C-LP-b-400-3	0.527
14	PU1-LP-b-400-3	0.522
27	PU1-C-LP-b-1000-2	0.498
16	PU1-LP-b-1000-2	0.493

	Scenario 4	
Plan	*Plan Code*	*Utility*
3	PU1-NS-100	0.804
5	PU1-NS-1000	0.793
4	PU1-NS-400	0.791
2	PU1-R2	0.773
18	PU1-C-HL-a-100-3	0.753
7	PU1-HL-a-100-3	0.747
17	PU1-C-HL-a-100-2	0.728
6	PU1-HL-a-100-2	0.723
19	PU1-C-HL-b-400-2	0.650
20	PU1-C-HL-b-400-3	0.648
8	PU1-HL-b-400-2	0.644
9	PU1-HL-b-400-3	0.641
21	PU1-C-LP-a-100-1	0.639
10	PU1-LP-a-100-1	0.630
1	PU1-0	0.627
22	PU1-C-LP-a-100-2	0.595
23	PU1-C-LP-a-100-3	0.595
11	PU1-LP-a-100-2	0.590
12	PU1-LP-a-100-3	0.590
24	PU1-C-LP-b-400-1	0.566
13	PU1-LP-b-400-1	0.558
26	PU1-C-LP-b-1000-1	0.533
15	PU1-LP-b-1000-1	0.527
25	PU1-C-LP-b-400-3	0.507
14	PU1-LP-b-400-3	0.501
27	PU1-C-LP-b-1000-2	0.451
16	PU1-LP-b-1000-2	0.446

Table 13. Plans Ranked by Multi-attribute Utility Score for PU-1, Preference Pattern B.

PU-1: B

	Scenario 1	
Plan	*Plan Code*	*Utility*
5	PU1-NS-1000	0.806
4	PU1-NS-400	0.787
3	PU1-NS-100	0.769
18	PU1-C-HL-a-100-3	0.721
2	PU1-R2	0.716
17	PU1-C-HL-a-100-2	0.716
19	PU1-C-HL-b-400-2	0.715
7	PU1-HL-a-100-3	0.709
6	PU1-HL-a-100-2	0.705
8	PU1-HL-b-400-2	0.702
21	PU1-C-LP-a-100-1	0.678
20	PU1-C-HL-b-400-3	0.677
9	PU1-HL-b-400-3	0.663
10	PU1-LP-a-100-1	0.660
22	PU1-C-LP-a-100-2	0.647
23	PU1-C-LP-a-100-3	0.638
11	PU1-LP-a-100-2	0.635
12	PU1-LP-a-100-3	0.625
24	PU1-C-LP-b-400-1	0.619
27	PU1-C-LP-b-1000-2	0.603
26	PU1-C-LP-b-1000-1	0.603
13	PU1-LP-b-400-1	0.596
16	PU1-LP-b-1000-2	0.589
25	PU1-C-LP-b-400-3	0.588
15	PU1-LP-b-1000-1	0.579
14	PU1-LP-b-400-3	0.574
1	PU1-0	0.550

	Scenario 2	
Plan	*Plan Code*	*Utility*
5	PU1-NS-1000	0.793
4	PU1-NS-400	0.773
3	PU1-NS-100	0.749
18	PU1-C-HL-a-100-3	0.694
17	PU1-C-HL-a-100-2	0.690
2	PU1-R2	0.686
7	PU1-HL-a-100-3	0.681
19	PU1-C-HL-b-400-2	0.681
6	PU1-HL-a-100-2	0.679
8	PU1-HL-b-400-2	0.666
20	PU1-C-HL-b-400-3	0.647
21	PU1-C-LP-a-100-1	0.641
9	PU1-HL-b-400-3	0.630
10	PU1-LP-a-100-1	0.622
22	PU1-C-LP-a-100-2	0.610
23	PU1-C-LP-a-100-3	0.601
11	PU1-LP-a-100-2	0.597
24	PU1-C-LP-b-400-1	0.588
12	PU1-LP-a-100-3	0.588
26	PU1-C-LP-b-1000-1	0.570
13	PU1-LP-b-400-1	0.564
25	PU1-C-LP-b-400-3	0.552
15	PU1-LP-b-1000-1	0.543
14	PU1-LP-b-400-3	0.537
27	PU1-C-LP-b-1000-2	0.492
1	PU1-0	0.480
16	PU1-LP-b-1000-2	0.477

	Scenario 3	
Plan	*Plan Code*	*Utility*
5	PU1-NS-1000	0.807
4	PU1-NS-400	0.792
3	PU1-NS-100	0.775
18	PU1-C-HL-a-100-3	0.737
2	PU1-R2	0.736
17	PU1-C-HL-a-100-2	0.731
19	PU1-C-HL-b-400-2	0.728
7	PU1-HL-a-100-3	0.726
6	PU1-HL-a-100-2	0.722
8	PU1-HL-b-400-2	0.718
21	PU1-C-LP-a-100-1	0.692
20	PU1-C-HL-b-400-3	0.691
9	PU1-HL-b-400-3	0.679
10	PU1-LP-a-100-1	0.677
22	PU1-C-LP-a-100-2	0.660
11	PU1-LP-a-100-2	0.652
23	PU1-C-LP-a-100-3	0.651
12	PU1-LP-a-100-3	0.642
24	PU1-C-LP-b-400-1	0.631
26	PU1-C-LP-b-1000-1	0.614
27	PU1-C-LP-b-1000-2	0.614
13	PU1-LP-b-400-1	0.613
16	PU1-LP-b-1000-2	0.605
25	PU1-C-LP-b-400-3	0.601
15	PU1-LP-b-1000-1	0.595
14	PU1-LP-b-400-3	0.591
1	PU1-0	0.579

	Scenario 4	
Plan	*Plan Code*	*Utility*
5	PU1-NS-1000	0.795
4	PU1-NS-400	0.779
3	PU1-NS-100	0.757
18	PU1-C-HL-a-100-3	0.714
2	PU1-R2	0.711
17	PU1-C-HL-a-100-2	0.710
7	PU1-HL-a-100-3	0.703
6	PU1-HL-a-100-2	0.700
19	PU1-C-HL-b-400-2	0.698
8	PU1-HL-b-400-2	0.687
20	PU1-C-HL-b-400-3	0.664
21	PU1-C-LP-a-100-1	0.661
9	PU1-HL-b-400-3	0.652
10	PU1-LP-a-100-1	0.645
22	PU1-C-LP-a-100-2	0.627
23	PU1-C-LP-a-100-3	0.619
11	PU1-LP-a-100-2	0.618
12	PU1-LP-a-100-3	0.610
24	PU1-C-LP-b-400-1	0.606
13	PU1-LP-b-400-1	0.586
26	PU1-C-LP-b-1000-1	0.586
25	PU1-C-LP-b-400-3	0.568
15	PU1-LP-b-1000-1	0.565
14	PU1-LP-b-400-3	0.558
1	PU1-0	0.524
27	PU1-C-LP-b-1000-2	0.507
16	PU1-LP-b-1000-2	0.498

Table 14. Plans Ranked by Multi-attribute Utility Score for PU-1, Preference Pattern C.

PU-1: C

	Scenario 1	
Plan	*Plan Code*	*Utility*
19	PU1-C-HL-b-400-2	0.752
8	PU1-HL-b-400-2	0.742
27	PU1-C-LP-b-1000-2	0.737
16	PU1-LP-b-1000-2	0.726
17	PU1-C-HL-a-100-2	0.711
22	PU1-C-LP-a-100-2	0.709
25	PU1-C-LP-b-400-3	0.703
6	PU1-HL-a-100-2	0.703
11	PU1-LP-a-100-2	0.700
5	PU1-NS-1000	0.699
18	PU1-C-HL-a-100-3	0.696
14	PU1-LP-b-400-3	0.692
23	PU1-C-LP-a-100-3	0.692
20	PU1-C-HL-b-400-3	0.691
21	PU1-C-LP-a-100-1	0.690
7	PU1-HL-a-100-3	0.687
24	PU-1:C-LP-b-400-1	0.685
4	PU1-NS-400	0.685
3	PU1-NS-100	0.683
12	PU1-LP-a-100-3	0.682
9	PU1-HL-b-400-3	0.680
10	PU1-LP-a-100-1	0.676
26	PU1-C-LP-b-1000-1	0.676
13	PU1-LP-b-400-1	0.669
15	PU1-LP-b-1000-1	0.658
2	PU1-R2	0.635
1	PU1-0	0.449

	Scenario 2	
Plan	*Plan Code*	*Utility*
19	PU1-C-HL-b-400-2	0.700
8	PU1-HL-b-400-2	0.689
17	PU1-C-HL-a-100-2	0.678
5	PU1-NS-1000	0.675
6	PU1-HL-a-100-2	0.670
22	PU1-C-LP-a-100-2	0.665
4	PU1-NS-400	0.660
18	PU1-C-HL-a-100-3	0.659
25	PU1-C-LP-b-400-3	0.656
11	PU1-LP-a-100-2	0.655
20	PU1-C-HL-b-400-3	0.655
24	PU1-C-LP-b-400-1	0.653
3	PU1-NS-100	0.653
7	PU1-HL-a-100-3	0.650
23	PU1-C-LP-a-100-3	0.645
14	PU1-LP-b-400-3	0.644
9	PU1-HL-b-400-3	0.642
21	PU-1:C-LP-a-100-1	0.642
13	PU1-LP-b-400-1	0.635
12	PU1-LP-a-100-3	0.634
26	PU-1:C-LP-b-1000-1	0.632
10	PU1-LP-a-100-1	0.628
15	PU1-LP-b-1000-1	0.611
27	PU1-C-LP-b-1000-2	0.598
2	PU1-R2	0.595
16	PU1-LP-b-1000-2	0.586
1	PU1-0	0.369

	Scenario 3	
Plan	*Plan Code*	*Utility*
19	PU1-C-HL-b-400-2	0.771
8	PU1-HL-b-400-2	0.764
27	PU1-C-LP-b-1000-2	0.755
16	PU1-LP-b-1000-2	0.748
17	PU1-C-HL-a-100-2	0.733
22	PU1-C-LP-a-100-2	0.729
6	PU1-HL-a-100-2	0.727
11	PU1-LP-a-100-2	0.723
25	PU1-C-LP-b-400-3	0.722
18	PU1-C-HL-a-100-3	0.719
14	PU1-LP-b-400-3	0.715
23	PU1-C-LP-a-100-3	0.712
7	PU1-HL-a-100-3	0.712
21	PU1-C-LP-a-100-1	0.711
20	PU1-C-HL-b-400-3	0.711
12	PU1-LP-a-100-3	0.706
9	PU1-HL-b-400-3	0.703
24	PU-1:C-LP-b-400-1	0.703
10	PU1-LP-a-100-1	0.700
5	PU1-NS-1000	0.700
3	PU1-NS-100	0.693
13	PU1-LP-b-400-1	0.692
26	PU1-C-LP-b-1000-1	0.691
4	PU1-NS-400	0.689
15	PU1-LP-b-1000-1	0.681
2	PU1-R2	0.664
1	PU1-0	0.487

	Scenario 4	
Plan	*Plan Code*	*Utility*
19	PU1-C-HL-b-400-2	0.724
8	PU1-HL-b-400-2	0.717
17	PU1-C-HL-a-100-2	0.704
6	PU1-HL-a-100-2	0.698
22	PU1-C-LP-a-100-2	0.688
18	PU1-C-HL-a-100-3	0.686
11	PU1-LP-a-100-2	0.682
25	PU1-C-LP-b-400-3	0.679
20	PU1-C-HL-b-400-3	0.679
7	PU1-HL-a-100-3	0.679
5	PU1-NS-1000	0.677
24	PU1-C-LP-b-400-1	0.676
14	PU1-LP-b-400-3	0.672
9	PU1-HL-b-400-3	0.670
23	PU-1:C-LP-a-100-3	0.669
21	PU-1:C-LP-a-100-1	0.668
4	PU1-NS-400	0.665
3	PU1-NS-100	0.665
13	PU1-LP-b-400-1	0.664
12	PU1-LP-a-100-3	0.663
10	PU1-LP-a-100-1	0.658
26	PU1-C-LP-b-1000-1	0.652
15	PU1-LP-b-1000-1	0.640
2	PU1-R2	0.629
27	PU1-C-LP-b-1000-2	0.620
16	PU1-LP-b-1000-2	0.613
1	PU1-0	0.423

Figure 11. Contributions of Each Metric to the Multi-attribute Utility Score for Preference Pattern A by Scenario for PU-1.

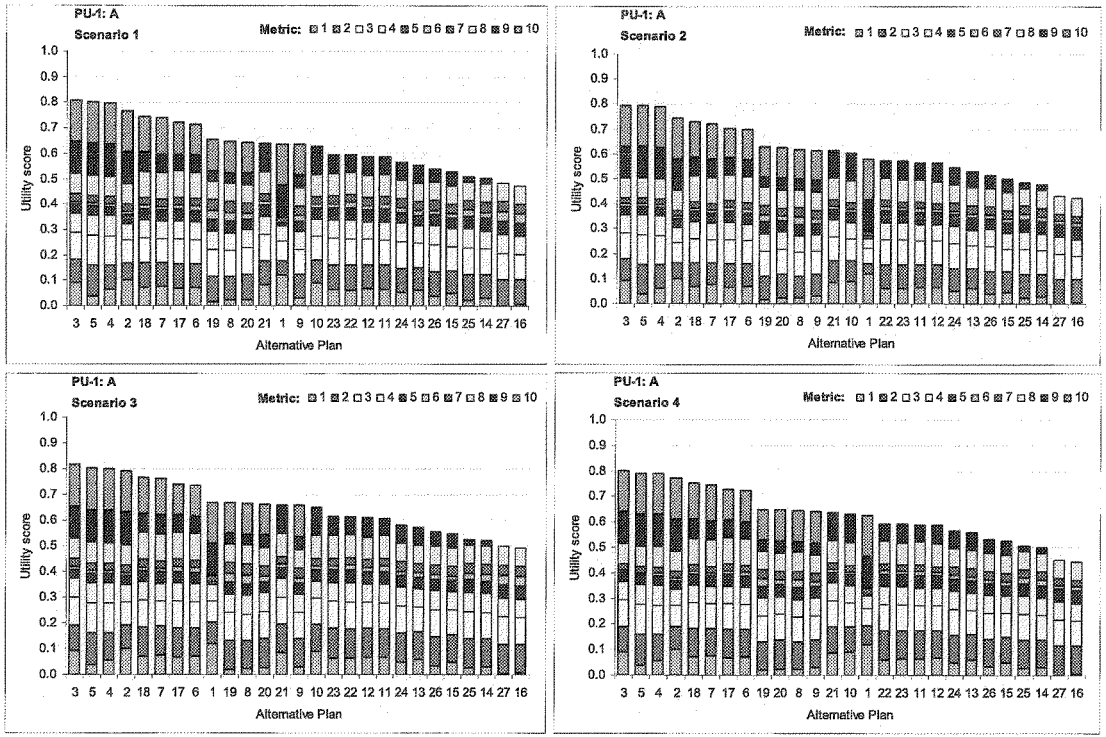


Figure 12. Contributions of Each Metric to the Multi-attribute Utility Score for Preference Pattern B by Scenario for PU-1.

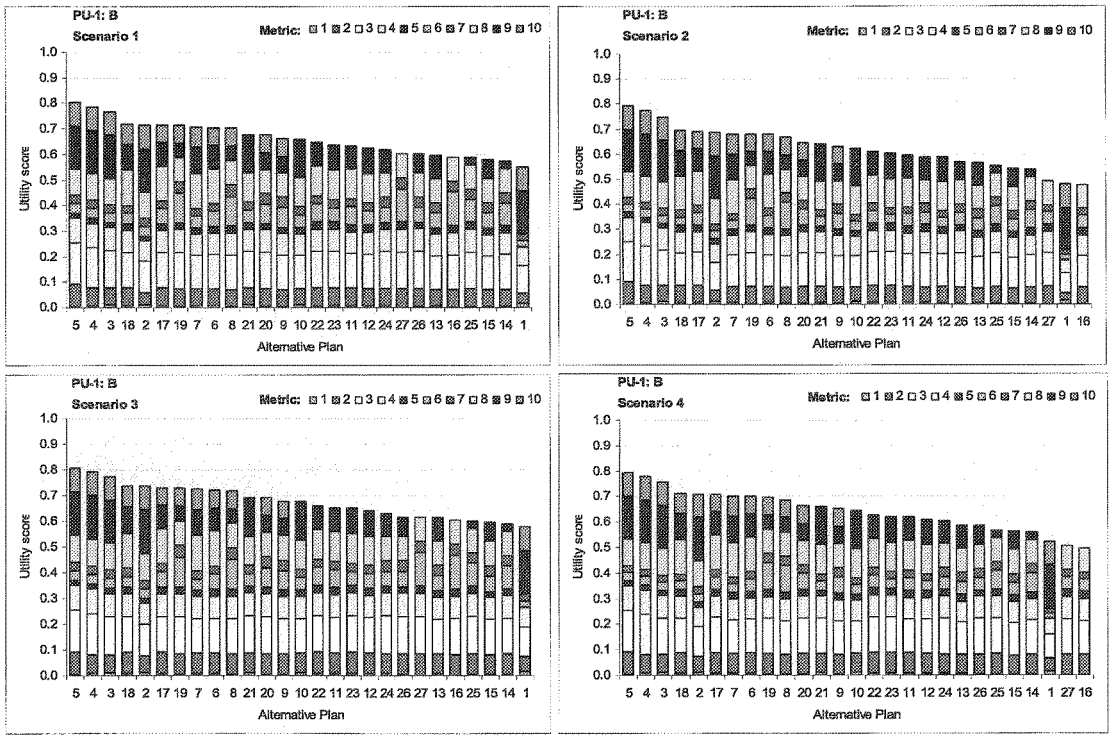


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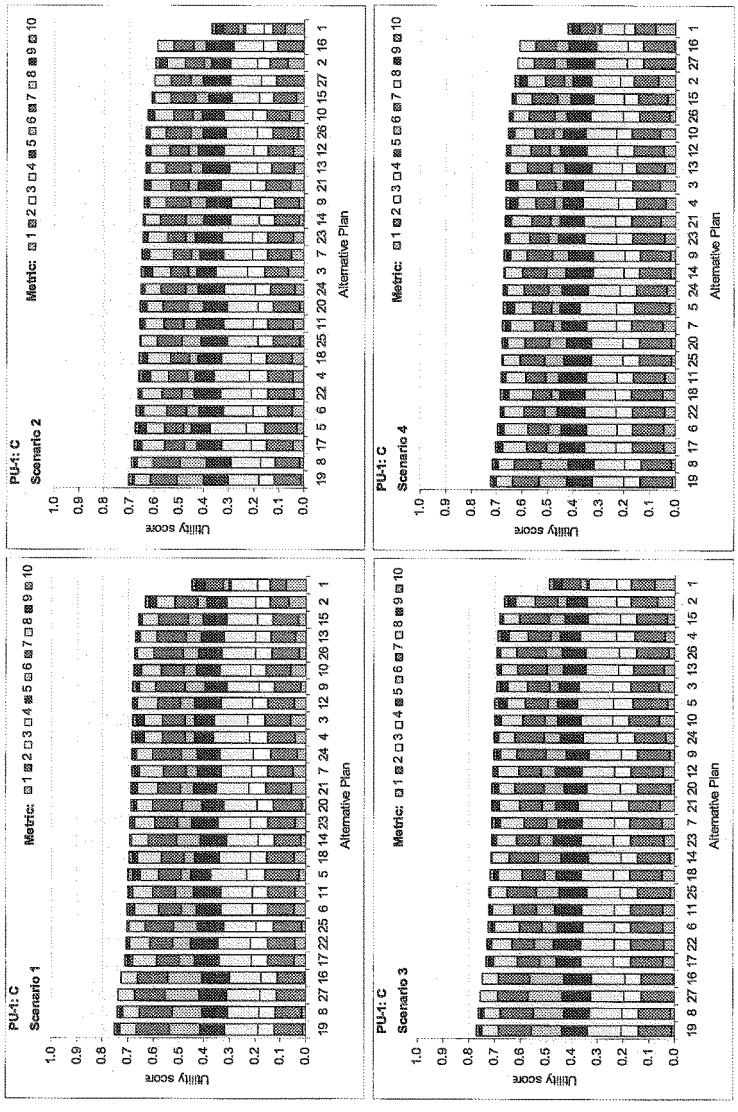
Figure 13. Contributions of Each Metric to the Multi-attribute Utility Score for Preference Pattern C by Scenario for PU-1.



6.2.1 Sensitivity of Preferred Alternatives – Planning Unit 1

Table 15 shows the preferred alternatives over four possible relative sea level rise and re-development scenarios. Each cell indicates the preferred alternative given the scenario and the coastal alternative. For example, for PU-1:C, plan PU1-C-HL-b-400-2 (Plan 19) is preferred regardless of rate of relative sea level rise and pattern of development. This table shows that, for PU-1:B, the preference for plan PU1-NS-1000 (Plan 5) is also not sensitive to the assumptions made about relative sea level rise and pattern of redevelopment. This trend also holds for PU-1:A, where PU1-NS-100 (Plan 3) is preferred.

Table 15. Preferred Plan for Three Preference Patterns in PU1.

PU-1:A	Relative Sea-level Rise	
Pattern of Development	Lower	Higher
High/Dispersed	PU1-NS-100	PU1-NS-100
BAU/Compact	PU1-NS-100	PU1-NS-100

PU-1:B	Relative Sea-level Rise	
Pattern of Development	Lower	Higher
High/Dispersed	PU1-NS-1000	PU1-NS-1000
BAU/Compact	PU1-NS-1000	PU1-NS-1000

PU-1:C	Relative Sea-level Rise	
Pattern of Development	Lower	Higher
High/Dispersed	PU1-C-HL-b-400-2	PU1-C-HL-b-400-2
BAU/Compact	PU1-C-HL-b-400-2	PU1-C-HL-b-400-2

6.2.2. Expected Utility – Planning Unit 1

In a decision analysis with uncertainty, the preferred alternative is the one that maximizes expected utility. In this analysis, we calculate expected utility for each of the development scenarios treating relative sea-level rise (RSLR) as uncertain. Our ability to address uncertainty

in the development patterns is limited because these scenarios are associated with the extreme values of the regional economy metrics. This reduced set of development scenarios was necessitated by logistical and resource constraints.

Figures 14 through 16 plot the expected utility of each alternative given an allocation of probability to each of the two relative sea level rise scenarios (P(RSLR = Lower) = 0.5 and P(RSLR = Higher) = 0.5) for each the characteristic stakeholder groups. These three figures illustrate the expected utility of each alternative assuming a high employment growth rate and a dispersed population scenario. (BAU/Compact was not generated.) These figures illustrate how the utility of some alternatives may be more or less sensitive to relative sea level rise assumptions than the utility of other alternatives. The error bands on expected utility represent the minimum and maximum levels of utility over the four scenarios considered in the LACPR plan. Alternatives that are more sensitive to relative sea level rise and development assumptions will have larger error bands and those alternatives with narrow error bands yield the most predictable levels of utility. For example, Plans 4 and 5 have narrow error bands for all three preference patterns. The expected utility of any given alternative and its range of possible values depends in part upon what set of weights is chosen.

The calculation of expected utility requires the assignment of probability to each scenario, but in this case our interest is not in any particular set of probabilities. Rather, our interest is in understanding how the different alternatives perform under different allocations of probability to the scenarios. For example, a change in the probabilities might cause expected utility for some alternatives to increase while causing expected utility for other alternatives to decrease. We are also interested in the range of expected utility for each scenario. The expected utilities shown in these figures assume high employment/dispersed populations. Alternatives that have expected utilities with smaller ranges represent more predictable outcomes. These alternatives (for example, Plan 5 in Figure 14) may be preferred to others that have larger ranges (for example, Plan 3) because these alternatives lead to more predictable outcomes.

Figure 14. Expected Utility of each PU-1 Alternative for Preference Pattern A, showing minimum and maximum utility scores. (Scenarios 1 & 2: High Employment/ Dispersed Population).

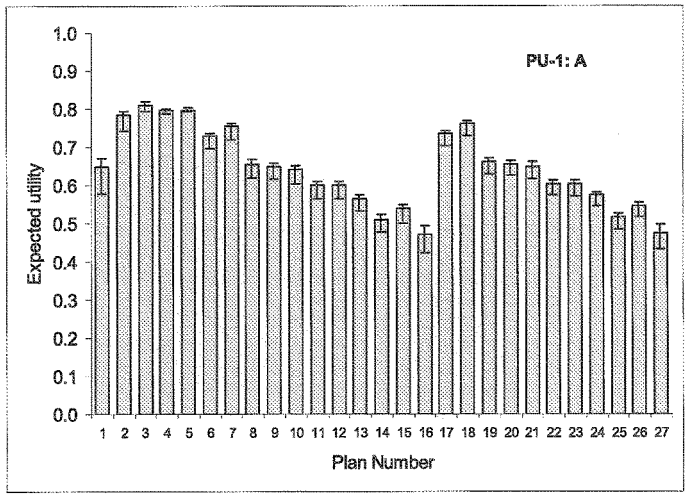


Figure 15. Expected Utility of each PU-1 Alternative for Preference Pattern B, showing minimum and maximum utility scores. (Scenarios 1 & 2: High Employment/ Dispersed Population).

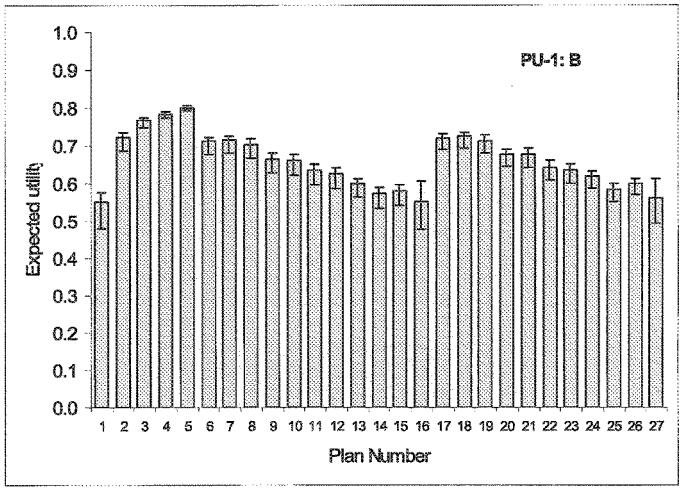
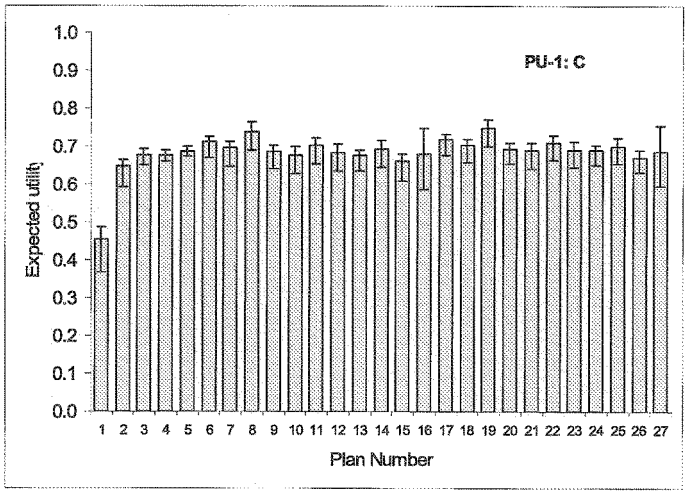


Figure 16. Expected Utility of each PU-1 Alternative for Preference Pattern C, showing minimum and maximum utility scores. (Scenarios 1 & 2: High Employment/ Dispersed Population).



6.2.3 Sensitivity of Decisions to Assumptions about the Probability of Higher Levels of Relative Sea Level Rise – Planning Unit 1

Table 16 shows the sensitivity of the preferred alternative to assumptions about the allocation of probabilities to relative sea level rise scenarios for each of the three preference patterns and for each development scenario. For PU-1:A, the decision is insensitive for all scenarios, with Plan 3 being preferred. This trend holds for PU-1:B and PU-1:C, where Plans 5 and 19 are preferred, respectively.

Table 16. Preferred Plan Matrix for PU-1

PU-1: A	Probability (RSLR = Higher)										
Development Scenario	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
High Employment/ Dispersed Population (Scenarios 1&2)	3	3	3	3	3	3	3	3	3	3	3
BAU Employment/ Compact Population (Scenarios 3&4)	3	3	3	3	3	3	3	3	3	3	3

PU-1: B	Probability (RSLR = Higher)										
Development Scenario	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
High Employment/ Dispersed Population (Scenarios 1&2)	5	5	5	5	5	5	5	5	5	5	5
BAU Employment/ Compact Population (Scenarios 3&4)	5	5	5	5	5	5	5	5	5	5	5

PU-1: C	Probability (RSLR = Higher)										
Development Scenario	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
High Employment/ Dispersed Population (Scenarios 1&2)	19	19	19	19	19	19	19	19	19	19	19
BAU Employment/ Compact Population (Scenarios 3&4)	19	19	19	19	19	19	19	19	19	19	19

6.3 Results for Illustrative Preference Patterns – Planning Unit 2

The illustrative preference patterns are assigned the labels PU-2:A, PU-2:B, and PU-2:C. Table 17 lists the weights for each preference pattern and Figure 17 displays the weights graphically by showing the proportion of total weight on each objective in a pie-chart. PU-2:A has the highest weights on minimizing direct wetland impacts (DWI), minimizing indirect environmental impacts (IEI), and minimizing construction time (TIME). Also of high importance to this preference pattern is reducing life cycle costs (COST), minimizing direct economic damages (DAM), and minimizing employment impacts (EMP). Protecting historic districts, historic properties, and archeological sites are less important than the other objectives. PU-2:B puts the highest weight on minimizing resident population impacts (POP), but also values minimizing employment impacts (EMP) and protecting historic properties, districts and archeological sites (HPRO, HDIS and ASIT). PU-2:B places relatively little importance on minimizing direct wetland impacts (DWI) and indirect environmental impacts (IEI). The preference pattern embodied by PU-2:C emphasizes minimizing indirect environmental impacts (IEI), minimizing life cycle costs (COST), and minimizing population impacts (POP). PU-2:C also emphasizes minimizing impacts to archeological sites (ASIT), historic properties protected (HPRO) and historic districts (HDIS), but places relatively little importance on minimizing construction time and minimizing direct economic damages (DAM).

Table 17. Swing weights for three illustrative preference patterns discussed for PU2.

#	Code	Name	PU-2:A	PU-2:B	PU-2:C
1	COST	Life-cycle Cost ($ Billions)	0.1194	0.0775	0.1406
2	POP	Population Impacted (People/Year)	0.0746	0.1550	0.1406
3	DAM	Direct Economic Damages ($ Millions/Year)	0.1119	0.0775	0.0469
4	EMP	Employment Impacts (Jobs Disrupted/Year)	0.1119	0.1473	0.0859
5	ASIT	Archeological Sites Protected (Number of Sites)	0.0448	0.1240	0.1094
6	HDIS	Historic Districts Protected (Number of Districts)	0.0448	0.1395	0.0938
7	HPRO	Historic Properties Protected (Number of Properties)	0.0448	0.1395	0.1094
8	TIME	Construction Time (Years)	0.1493	0.0930	0.0234
9	DWI	Direct Wetland Impacts (Acres)	0.1493	0.0310	0.0938
10	IEI	Indirect Environmental Impacts (Scale; -8 to +8)	0.1493	0.0155	0.1563
		Top-ranked metric	DWI, IEI, TIME	POP	IEI

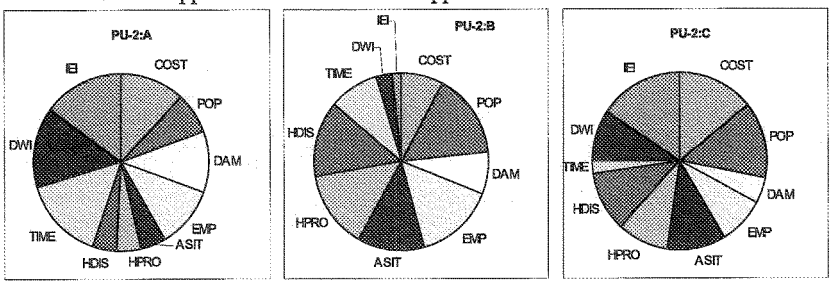
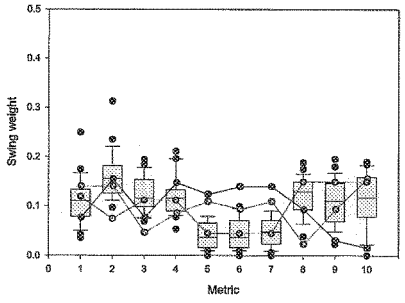


Figure 17. Three illustrative preference patterns discussed for PU2.

The illustrative preference patterns selected for discussion here are each unique within the planning unit, but they are not necessarily atypical. Usually, a preference pattern contains some weights that are similar to those of other stakeholders and some weights that represent extremes. Figure 18 shows how each of the swing weights in the illustrative preference pattern compares to the other swing weights in this planning unit. In this figure, the three color-coded sets of weights are overlaid on the box plots that were introduced in Section 3. The closer each of the color-coded points is to being within the gray box for a particular performance measure, the more typical the weight. Points that fall outside the error bars that surround the gray box indicate extreme positions relative to other survey respondents, or outliers. For example, PU-2:A is color-coded red. Of all the stakeholders who participated in the preference assessment in this planning unit, this stakeholder placed the lowest weight on metric 2, minimizing population impacts (POP). However, all of the other weights were in the typical range. PU-2:B is color-coded in blue. This stakeholder placed unusually high weight on metric 5, protecting archeological sites (ASIT), metric 6, protecting historic properties (HPRO), and metric 7, protecting historic districts (HDIS). This stakeholder also placed unusually low weights on metric 9, minimizing direct wetland impacts (DWI), and minimizing indirect environmental impacts (IEI). PU-2:C stands out for unusually low weights on metric 3, minimizing direct economic damages (DAM), metric 8, minimizing construction time (TIME), and unusually high weights on metric 5, protecting archeological sites (ASIT), metric 6, protecting historic properties (HPRO), and metric 7, protecting historic districts (HDIS).



#	Code	Metric Name
1	COST	Life-cycle Cost ($ Billions)
2	POP	Population Impacted (People/Year)
3	DAM	Direct Economic Damages ($ Millions/Year)
4	EMP	Employment Impacts (Jobs Disrupted/Year)
5	ASIT	Archeological Sites Protected (Number of Sites)
6	HDIS	Historic Districts Protected (Number of Districts)
7	HPRO	Historic Properties Protected (Number of Properties)
8	TIME	Construction Time (Years)
9	DWI	Direct Wetland Impacts (Acres)
10	IEI	Indirect Environmental Impacts (Scale; -8 to +8)

Figure 18. Swing weights for the three preference patterns evaluated for PU2 superimposed on the swing weight box plot (previously introduced in Section 3). See Table 17 for explanation of how the metrics are numbered. The preference patterns are color coded as follows: PU-2:A is red, PU-2:B is blue, and PU-2:C is green.

These three illustrative preference patterns produce a unique rank order of plans. These rank orders are illustrated in Figure 19 for each of the preference patterns. The underlying table was introduced in Section 5 and shows the number of times that each plan ranked first, second, third, fourth, or fifth when plans were ranked in decreasing order by the utility score. The top five plans for PU-2:A are marked in red. The top-ranked plan for PU-2:A was the comprehensive 100-year West Bank Interior (C-WBI) alignment (PU2-C-WBI-100-1). This was the top ranked plan for 24 of the stakeholders who participated in the preference assessment. The other plans among the top five for this preference pattern include PU2-WBI-100-1 (100-year West Bank Interior alignment), PU2-C-R-100-2, PU2-C-R-100-3 (two 100-year Comprehensive Ridge alignments), and PU2-R-100-2 (a 100-year Ridge alignment). These results are presented here to illustrate that different sets of weights lead to different rankings of plans. While the rankings suggest order of preference, they do not indicate how much more or less preferred a plan is relative to other plans. In addition, these figures do not help explain why a particular set of weights leads to a particular ranking of plans. These issues are discussed in greater detail below.

PU2, Scenario 1						
PLAN CODE	Rank Based on Swing Weights					Total
	1	2	3	4	5	
PU2-C-G-100-1	0	1	2	1	1	5
PU2-C-G-100-4	1	0	1	0	0	2
PU2-C-R-100-2	0	1	13	8	0	22
PU2-C-R-100-3	0	1	12	11	10	24
PU2-C-R-100-4	0	0	0	0	8	8
PU2-C-R-400-2	0	0	0	0	0	0
PU2-C-R-400-3	2	1	4	1	2	10
PU2-C-WBI-100-1	24	1	0	0	0	25
PU2-C-WBI-400-1	0	0	0	0	1	1
PU2-G-100-1	0	0	0	1	0	1
PU2-G-100-4	0	0	1	0	0	1
PU2-NS-1000	0	1	0	0	0	1
PU2-NS-400	0	1	1	0	0	2
PU2-R-100-2	0	0	0	2	5	7
PU2-R-400-3	0	1	0	0	0	1
PU2-WBI-100-1	0	19	3	3	0	25
Total	27	27	27	27	27	135

Figure 19. Rank order of the top five plans for the illustrative preference patterns. The preference patters are color coded as follows: PU-2:A is red, PU-2:B is blue, and PU-2:C is green.

MAU scores were calculated for each of the structural and nonstructural plans and the no-action alternative using a full set of ten metrics. In the discussion of PU-2 results that follows, plans are numbered 1 – 31 as indicated in Table 18 to facilitate discussion.

Table 18. Plan Numbers and Plan Names for PU2.

Plan	*Plan Code*
1	PU2-0
2	PU2-R2
3	PU2-NS-100
4	PU2-NS-400
5	PU2-NS-1000
6	PU2-G-100-1
7	PU2-G-100-4
8	PU2-G-400-4
9	PU2-G-1000-4
10	PU2-R-100-2
11	PU2-R-100-3
12	PU2-R-100-4
13	PU2-R-400-2
14	PU2-R-400-3
15	PU2-R-400-4
16	PU2-R-1000-4
17	PU2-WBI-100-1

18	PU2-WBI-400-1
19	PU2-C-G-100-1
20	PU2-C-G-100-4
21	PU2-C-G-400-4
22	PU2-C-G-1000-4
23	PU2-C-R-100-2
24	PU2-C-R-100-3
25	PU2-C-R-100-4
26	PU2-C-R-400-2
27	PU2-C-R-400-3
28	PU2-C-R-400-4
29	PU2-C-R-1000-4
30	PU2-C-WBI-100-1
31	PU2-C-WBI-400-1

The 31 plans are ranked by MAU for each scenario and each of the three preference patterns in Tables 19 through 21. For example, Table 19 shows the utility of the top-ranked Plan 30 for PU-2:A under the planning assumptions used in Scenarios 1 and 3 is 0.795 and 0.815, respectively. Under the assumptions of Scenario 2 and 4, Plan 30 remains the top-ranked plan, but the utility score decreases to 0.779 and 0.802, respectively. The lower-levels of performance for this plan in Scenarios 2 and 4 can be attributed to the higher rates of sea-level rise assumed in these scenarios. For preference pattern PU-2:B, the effect of higher rates of sea-level rise is to make a different comprehensive plan (PU2-C-G-100-4; Plan 20) more attractive than Plan 30. This shows sensitivity of the preferred plan to uncertainty in sea-level rise assumptions. For PU-1:C, a third comprehensive plan (PU2-C-R-400-3; Plan 27) dominates the rankings under all four scenarios.

Figures 20 through 22 illustrate why different preference patterns might lead to different plan rankings by showing the contribution of each metric to utility for each plan, scenario, and preference pattern. For example, Figure 21 illustrates the contribution of each metric to utility for PU-2:A. Under a set of planning assumptions consistent with Scenario 1 (Lower RSLR and High Employment/Dispersed Population), the utility of Plan 30 for PU-2:A is 0.795. This can be attributed to the relative performance of this plan on those performance objectives that are important for this preference pattern. Although a plan may contribute substantially towards one of the performance objectives, if the weights reflect relatively little importance on that objective, the performance with respect to that objective will make little contribution towards the overall utility for this preference pattern.

For PU-2:A, the top-ranked plan is one that includes a combination of structural and non-structural measures: Plan 30 (Table 19 and Figure 20). For this group, the rank order of the top nine plans is not dependent upon scenario assumptions. The second ranked plan across all scenarios was also a comprehensive plan, combining structural and non-structural measures (Plan 17). Metrics most contributing to the MAU scores for PU-2:A were direct economic damages, (No. 3), employment impacts (No. 4), construction time (No. 8), direct wetland impacts (No. 9) and indirect environmental impacts (No. 10). Although a particular metric may make substantial contributions toward overall utility, performance metrics that do not vary among decision alternatives will tend to have little impact on plan rankings. This holds true for direct wetland impacts (No. 9) and indirect environmental impacts (No. 10). Although these metrics contribute to the MAU score, they have little influence on the ranking of structural and nonstructural alternatives because they do not vary. Metrics most influencing overall utility for the two top ranked plans are construction time and direct wetland impacts (Nos. 8 and 9).

The top ranking plans for PU-2:B are those that include a combination of structural and non-structural plans (Plans 20 and 19) (Table 20 and Figure 21). The rank order for the top four plans was not sensitive to scenario assumptions. The metrics most contributing to MAU that distinguish the top and second-ranked plans were population impacts (No. 2) and economic damages (No. 3).

For PU-2:C, the three top-ranking plans are those that include a combination of structural and nonstructural measures: Plans 27, 14 and 23 (Table 21 and Figure 22). The rank order of the top three plans is dependent upon scenario assumptions. Plan 14 is second-ranked under Scenarios 1, 2 and 4 whereas Plan 23 is second ranked under Scenario 3. The metric most contributing to the MAU score for the top-ranked plan (Plan 27) in PU-2:C was indirect environmental impacts (No. 10) and protection of historic districts (No. 7) and archeological sites (No. 5). Metrics most influencing overall utility for the top ranked plan are population and employment impacts (Nos. 2 and 3).

Table 19. Plans Ranked by Multi-attribute Utility Score for PU-2, Preference Pattern A.

PU-2: A

	Scenario 1	
Plan	*Plan Code*	*Utility*
30	PU2-C-WBI-100-1	0.795
17	PU2-WBI-100-1	0.781
23	PU2-C-R-100-2	0.762
24	PU2-C-R-100-3	0.754
10	PU2-R-100-2	0.749
11	PU2-R-100-3	0.742
25	PU2-C-R-100-4	0.735
12	PU2-R-100-4	0.724
27	PU2-C-R-400-3	0.717
4	PU2-NS-400	0.702
3	PU2-NS-100	0.698
14	PU2-R-400-3	0.698
31	PU2-C-WBI-400-1	0.698
26	PU2-C-R-400-2	0.692
5	PU2-NS-1000	0.682
2	PU2-R2	0.675
18	PU2-WBI-400-1	0.675
13	PU2-R-400-2	0.672
28	PU2-C-R-400-4	0.671
19	PU2-C-G-100-1	0.665
15	PU2-R-400-4	0.654
6	PU2-G-100-1	0.652
20	PU2-C-G-100-4	0.643
29	PU2-C-R-1000-4	0.633
7	PU2-G-100-4	0.631
16	PU2-R-1000-4	0.616
21	PU2-C-G-400-4	0.506
8	PU2-G-400-4	0.491
1	PU2-0	0.460
22	PU2-C-G-1000-4	0.459
9	PU2-G-1000-4	0.443

	Scenario 2	
Plan	*Plan Code*	*Utility*
30	PU2-C-WBI-100-1	0.779
17	PU2-WBI-100-1	0.766
23	PU2-C-R-100-2	0.746
24	PU2-C-R-100-3	0.741
10	PU2-R-100-2	0.733
11	PU2-R-100-3	0.729
25	PU2-C-R-100-4	0.720
12	PU2-R-100-4	0.709
27	PU2-C-R-400-3	0.706
4	PU2-NS-400	0.695
3	PU2-NS-100	0.690
14	PU2-R-400-3	0.686
31	PU2-C-WBI-400-1	0.686
26	PU2-C-R-400-2	0.680
5	PU2-NS-1000	0.677
2	PU2-R2	0.663
18	PU2-WBI-400-1	0.661
28	PU2-C-R-400-4	0.660
13	PU2-R-400-2	0.659
19	PU2-C-G-100-1	0.654
15	PU2-R-400-4	0.642
6	PU2-G-100-1	0.641
20	PU2-C-G-100-4	0.633
7	PU2-G-100-4	0.622
29	PU2-C-R-1000-4	0.622
16	PU2-R-1000-4	0.603
21	PU2-C-G-400-4	0.496
8	PU2-G-400-4	0.480
22	PU2-C-G-1000-4	0.450
9	PU2-G-1000-4	0.433
1	PU2-0	0.420

	Scenario 3	
Plan	*Plan Code*	*Utility*
30	PU2-C-WBI-100-1	0.815
17	PU2-WBI-100-1	0.801
23	PU2-C-R-100-2	0.784
24	PU2-C-R-100-3	0.775
10	PU2-R-100-2	0.772
11	PU2-R-100-3	0.764
25	PU2-C-R-100-4	0.757
12	PU2-R-100-4	0.746
27	PU2-C-R-400-3	0.734
14	PU2-R-400-3	0.719
31	PU2-C-WBI-400-1	0.715
3	PU2-NS-100	0.715
26	PU2-C-R-400-2	0.711
18	PU2-WBI-400-1	0.697
2	PU2-R2	0.696
13	PU2-R-400-2	0.695
5	PU2-NS-1000	0.693
4	PU2-NS-400	0.692
28	PU2-C-R-400-4	0.690
19	PU2-C-G-100-1	0.687
15	PU2-R-400-4	0.677
6	PU2-G-100-1	0.674
20	PU2-C-G-100-4	0.663
7	PU2-G-100-4	0.652
29	PU2-C-R-1000-4	0.652
16	PU2-R-1000-4	0.639
21	PU2-C-G-400-4	0.526
8	PU2-G-400-4	0.513
1	PU2-0	0.510
22	PU2-C-G-1000-4	0.479
9	PU2-G-1000-4	0.465

	Scenario 4	
Plan	*Plan Code*	*Utility*
30	PU2-C-WBI-100-1	0.802
17	PU2-WBI-100-1	0.788
23	PU2-C-R-100-2	0.771
24	PU2-C-R-100-3	0.765
10	PU2-R-100-2	0.759
11	PU2-R-100-3	0.754
25	PU2-C-R-100-4	0.745
12	PU2-R-100-4	0.734
27	PU2-C-R-400-3	0.725
14	PU2-R-400-3	0.711
3	PU2-NS-100	0.707
31	PU2-C-WBI-400-1	0.706
26	PU2-C-R-400-2	0.701
5	PU2-NS-1000	0.687
2	PU2-R2	0.686
18	PU2-WBI-400-1	0.686
4	PU2-NS-400	0.685
13	PU2-R-400-2	0.685
28	PU2-C-R-400-4	0.681
19	PU2-C-G-100-1	0.677
15	PU2-R-400-4	0.668
6	PU2-G-100-1	0.664
20	PU2-C-G-100-4	0.656
7	PU2-G-100-4	0.645
29	PU2-C-R-1000-4	0.643
16	PU2-R-1000-4	0.629
21	PU2-C-G-400-4	0.518
8	PU2-G-400-4	0.505
1	PU2-0	0.479
22	PU2-C-G-1000-4	0.472
9	PU2-G-1000-4	0.457

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Table 20. Plans Ranked by Multi-attribute Utility Score for PU-2, Preference Pattern B.

PU-2: B

	Scenario 1	
Plan	*Plan Code*	*Utility*
20	PU2-C-G-100-4	0.789
19	PU2-C-G-100-1	0.785
7	PU2-G-100-4	0.773
6	PU2-G-100-1	0.767
27	PU2-C-R-400-3	0.748
21	PU2-C-G-400-4	0.743
22	PU2-C-G-1000-4	0.729
14	PU2-R-400-3	0.724
8	PU2-G-400-4	0.722
31	PU2-C-WBI-400-1	0.713
9	PU2-G-1000-4	0.705
26	PU2-C-R-400-2	0.703
28	PU2-C-R-400-4	0.703
29	PU2-C-R-1000-4	0.691
18	PU2-WBI-400-1	0.683
15	PU2-R-400-4	0.681
13	PU2-R-400-2	0.677
16	PU2-R-1000-4	0.667
30	PU2-C-WBI-100-1	0.658
23	PU2-C-R-100-2	0.647
24	PU2-C-R-100-3	0.642
17	PU2-WBI-100-1	0.639
10	PU2-R-100-2	0.630
11	PU2-R-100-3	0.627
25	PU2-C-R-100-4	0.626
12	PU2-R-100-4	0.611
4	PU2-NS-400	0.610
5	PU2-NS-1000	0.602
3	PU2-NS-100	0.591
2	PU2-R2	0.559
1	PU2-0	0.257

	Scenario 2	
Plan	*Plan Code*	*Utility*
20	PU2-C-G-100-4	0.776
19	PU2-C-G-100-1	0.770
7	PU2-G-100-4	0.760
6	PU2-G-100-1	0.751
27	PU2-C-R-400-3	0.731
21	PU2-C-G-400-4	0.729
22	PU2-C-G-1000-4	0.716
8	PU2-G-400-4	0.707
14	PU2-R-400-3	0.706
31	PU2-C-WBI-400-1	0.693
9	PU2-G-1000-4	0.691
28	PU2-C-R-400-4	0.685
26	PU2-C-R-400-2	0.685
29	PU2-C-R-1000-4	0.672
18	PU2-WBI-400-1	0.662
15	PU2-R-400-4	0.662
13	PU2-R-400-2	0.657
16	PU2-R-1000-4	0.647
30	PU2-C-WBI-100-1	0.627
24	PU2-C-R-100-3	0.619
23	PU2-C-R-100-2	0.616
17	PU2-WBI-100-1	0.609
11	PU2-R-100-3	0.604
10	PU2-R-100-2	0.599
25	PU2-C-R-100-4	0.596
4	PU2-NS-400	0.594
5	PU2-NS-1000	0.587
12	PU2-R-100-4	0.581
3	PU2-NS-100	0.573
2	PU2-R2	0.537
1	PU2-0	0.203

	Scenario 3	
Plan	*Plan Code*	*Utility*
20	PU2-C-G-100-4	0.827
19	PU2-C-G-100-1	0.825
7	PU2-G-100-4	0.812
6	PU2-G-100-1	0.807
27	PU2-C-R-400-3	0.782
21	PU2-C-G-400-4	0.780
22	PU2-C-G-1000-4	0.766
14	PU2-R-400-3	0.762
8	PU2-G-400-4	0.761
31	PU2-C-WBI-400-1	0.748
9	PU2-G-1000-4	0.745
26	PU2-C-R-400-2	0.740
28	PU2-C-R-400-4	0.739
29	PU2-C-R-1000-4	0.726
18	PU2-WBI-400-1	0.723
15	PU2-R-400-4	0.721
13	PU2-R-400-2	0.719
16	PU2-R-1000-4	0.707
30	PU2-C-WBI-100-1	0.695
23	PU2-C-R-100-2	0.687
24	PU2-C-R-100-3	0.680
17	PU2-WBI-100-1	0.677
10	PU2-R-100-2	0.671
11	PU2-R-100-3	0.665
25	PU2-C-R-100-4	0.665
12	PU2-R-100-4	0.650
5	PU2-NS-1000	0.625
3	PU2-NS-100	0.622
4	PU2-NS-400	0.621
2	PU2-R2	0.597
1	PU2-0	0.331

	Scenario 4	
Plan	*Plan Code*	*Utility*
20	PU2-C-G-100-4	0.816
19	PU2-C-G-100-1	0.811
7	PU2-G-100-4	0.801
6	PU2-G-100-1	0.794
21	PU2-C-G-400-4	0.768
27	PU2-C-R-400-3	0.767
22	PU2-C-G-1000-4	0.755
8	PU2-G-400-4	0.749
14	PU2-R-400-3	0.747
9	PU2-G-1000-4	0.733
31	PU2-C-WBI-400-1	0.731
28	PU2-C-R-400-4	0.724
26	PU2-C-R-400-2	0.724
29	PU2-C-R-1000-4	0.710
15	PU2-R-400-4	0.706
18	PU2-WBI-400-1	0.705
13	PU2-R-400-2	0.702
16	PU2-R-1000-4	0.691
30	PU2-C-WBI-100-1	0.667
24	PU2-C-R-100-3	0.660
23	PU2-C-R-100-2	0.660
17	PU2-WBI-100-1	0.649
11	PU2-R-100-3	0.645
10	PU2-R-100-2	0.643
25	PU2-C-R-100-4	0.638
12	PU2-R-100-4	0.624
5	PU2-NS-1000	0.611
4	PU2-NS-400	0.605
3	PU2-NS-100	0.605
2	PU2-R2	0.578
1	PU2-0	0.288

Table 21. Plans Ranked by Multi-attribute Utility Score for PU-2, Preference Pattern C.

PU-2: C

	Scenario 1	
Plan	*Plan Code*	*Utility*
27	PU2-C-R-400-3	0.717
14	PU2-R-400-3	0.705
23	PU2-C-R-100-2	0.704
10	PU2-R-100-2	0.698
24	PU2-C-R-100-3	0.696
26	PU2-C-R-400-2	0.691
11	PU2-R-100-3	0.690
30	PU2-C-WBI-100-1	0.684
31	PU2-C-WBI-400-1	0.683
28	PU2-C-R-400-4	0.678
17	PU2-WBI-100-1	0.678
13	PU2-R-400-2	0.677
25	PU2-C-R-100-4	0.673
18	PU2-WBI-400-1	0.669
12	PU2-R-100-4	0.667
15	PU2-R-400-4	0.666
19	PU2-C-G-100-1	0.659
6	PU2-G-100-1	0.651
20	PU2-C-G-100-4	0.647
29	PU2-C-R-1000-4	0.647
7	PU2-G-100-4	0.639
16	PU2-R-1000-4	0.635
3	PU2-NS-100	0.632
4	PU2-NS-400	0.631
2	PU2-R2	0.616
5	PU2-NS-1000	0.607
21	PU2-C-G-400-4	0.551
8	PU2-G-400-4	0.539
22	PU2-C-G-1000-4	0.514
9	PU2-G-1000-4	0.501
1	PU2-0	0.435

	Scenario 2	
Plan	*Plan Code*	*Utility*
27	PU2-C-R-400-3	0.705
14	PU2-R-400-3	0.692
23	PU2-C-R-100-2	0.682
24	PU2-C-R-100-3	0.680
26	PU2-C-R-400-2	0.678
10	PU2-R-100-2	0.676
11	PU2-R-100-3	0.674
31	PU2-C-WBI-400-1	0.670
28	PU2-C-R-400-4	0.665
13	PU2-R-400-2	0.663
30	PU2-C-WBI-100-1	0.662
17	PU2-WBI-100-1	0.656
18	PU2-WBI-400-1	0.655
15	PU2-R-400-4	0.653
25	PU2-C-R-100-4	0.652
19	PU2-C-G-100-1	0.649
12	PU2-R-100-4	0.645
6	PU2-G-100-1	0.640
20	PU2-C-G-100-4	0.638
29	PU2-C-R-1000-4	0.633
7	PU2-G-100-4	0.630
4	PU2-NS-400	0.621
3	PU2-NS-100	0.620
16	PU2-R-1000-4	0.620
2	PU2-R2	0.602
5	PU2-NS-1000	0.597
21	PU2-C-G-400-4	0.541
8	PU2-G-400-4	0.529
22	PU2-C-G-1000-4	0.505
9	PU2-G-1000-4	0.491
1	PU2-0	0.399

	Scenario 3	
Plan	*Plan Code*	*Utility*
27	PU2-C-R-400-3	0.745
23	PU2-C-R-100-2	0.738
14	PU2-R-400-3	0.737
10	PU2-R-100-2	0.732
24	PU2-C-R-100-3	0.728
11	PU2-R-100-3	0.722
26	PU2-C-R-400-2	0.720
30	PU2-C-WBI-100-1	0.716
13	PU2-R-400-2	0.712
31	PU2-C-WBI-400-1	0.712
17	PU2-WBI-100-1	0.710
28	PU2-C-R-400-4	0.708
25	PU2-C-R-100-4	0.706
18	PU2-WBI-400-1	0.703
15	PU2-R-400-4	0.700
12	PU2-R-100-4	0.700
19	PU2-C-G-100-1	0.693
6	PU2-G-100-1	0.686
20	PU2-C-G-100-4	0.679
29	PU2-C-R-1000-4	0.676
7	PU2-G-100-4	0.672
16	PU2-R-1000-4	0.668
3	PU2-NS-100	0.660
2	PU2-R2	0.650
4	PU2-NS-400	0.628
5	PU2-NS-1000	0.627
21	PU2-C-G-400-4	0.582
8	PU2-G-400-4	0.573
22	PU2-C-G-1000-4	0.545
9	PU2-G-1000-4	0.535
1	PU2-0	0.493

	Scenario 4	
Plan	*Plan Code*	*Utility*
27	PU2-C-R-400-3	0.735
14	PU2-R-400-3	0.727
23	PU2-C-R-100-2	0.719
24	PU2-C-R-100-3	0.715
10	PU2-R-100-2	0.713
26	PU2-C-R-400-2	0.709
11	PU2-R-100-3	0.709
13	PU2-R-400-2	0.701
31	PU2-C-WBI-400-1	0.700
28	PU2-C-R-400-4	0.697
30	PU2-C-WBI-100-1	0.696
18	PU2-WBI-400-1	0.691
17	PU2-WBI-100-1	0.690
15	PU2-R-400-4	0.689
25	PU2-C-R-100-4	0.687
19	PU2-C-G-100-1	0.684
12	PU2-R-100-4	0.681
6	PU2-G-100-1	0.676
20	PU2-C-G-100-4	0.672
7	PU2-G-100-4	0.665
29	PU2-C-R-1000-4	0.665
16	PU2-R-1000-4	0.656
3	PU2-NS-100	0.648
2	PU2-R2	0.637
5	PU2-NS-1000	0.617
4	PU2-NS-400	0.617
21	PU2-C-G-400-4	0.574
8	PU2-G-400-4	0.565
22	PU2-C-G-1000-4	0.538
9	PU2-G-1000-4	0.527
1	PU2-0	0.464

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Figure 20. Contributions of Each Metric to the Multi-attribute Utility Score for Preference Pattern A by Scenario for PU-2.

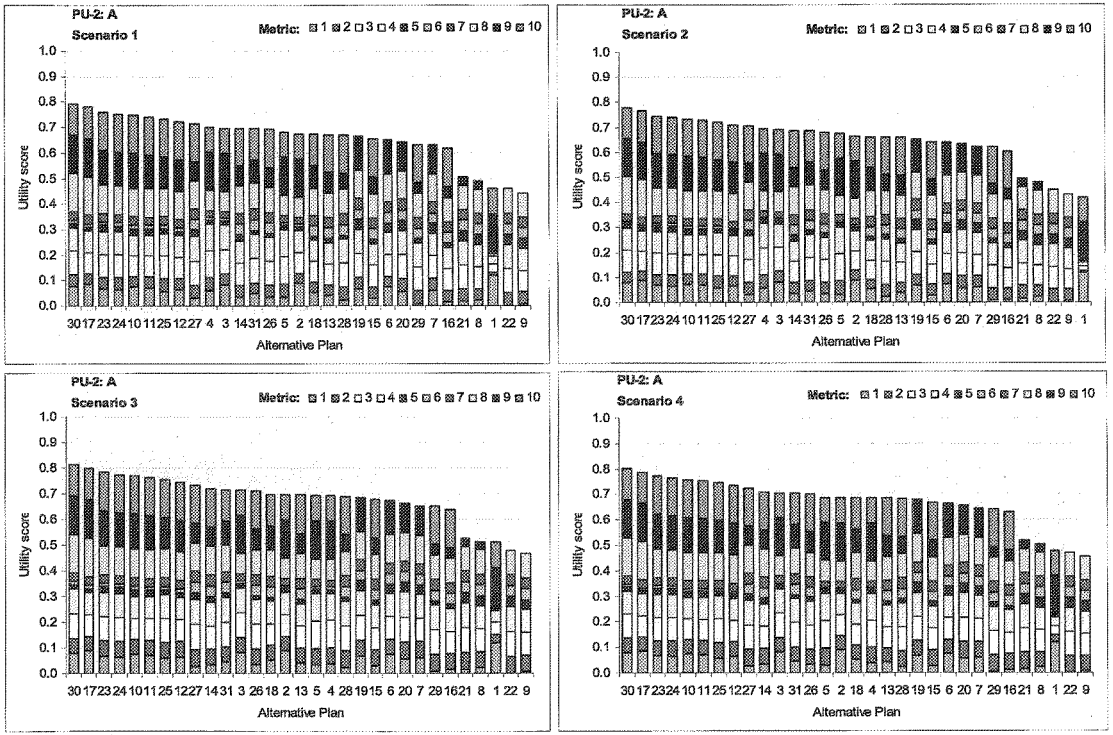


Figure 21. Contributions of Each Metric to the Multi-attribute Utility Score for Preference Pattern B by Scenario for PU-2.

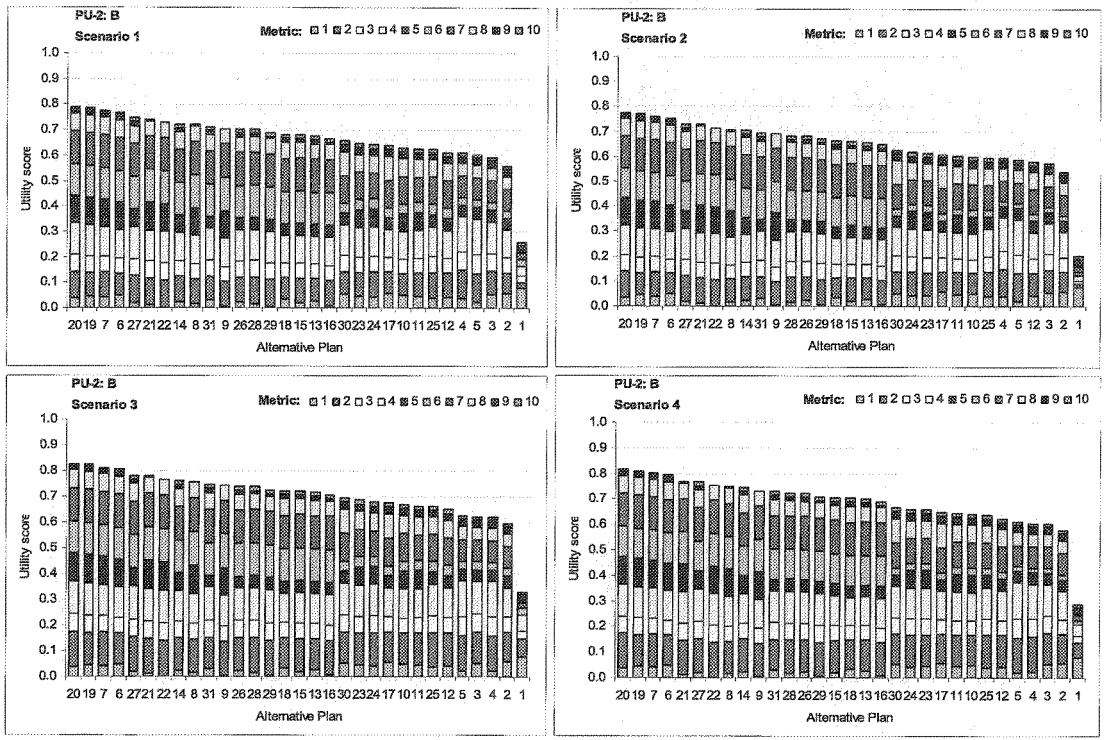
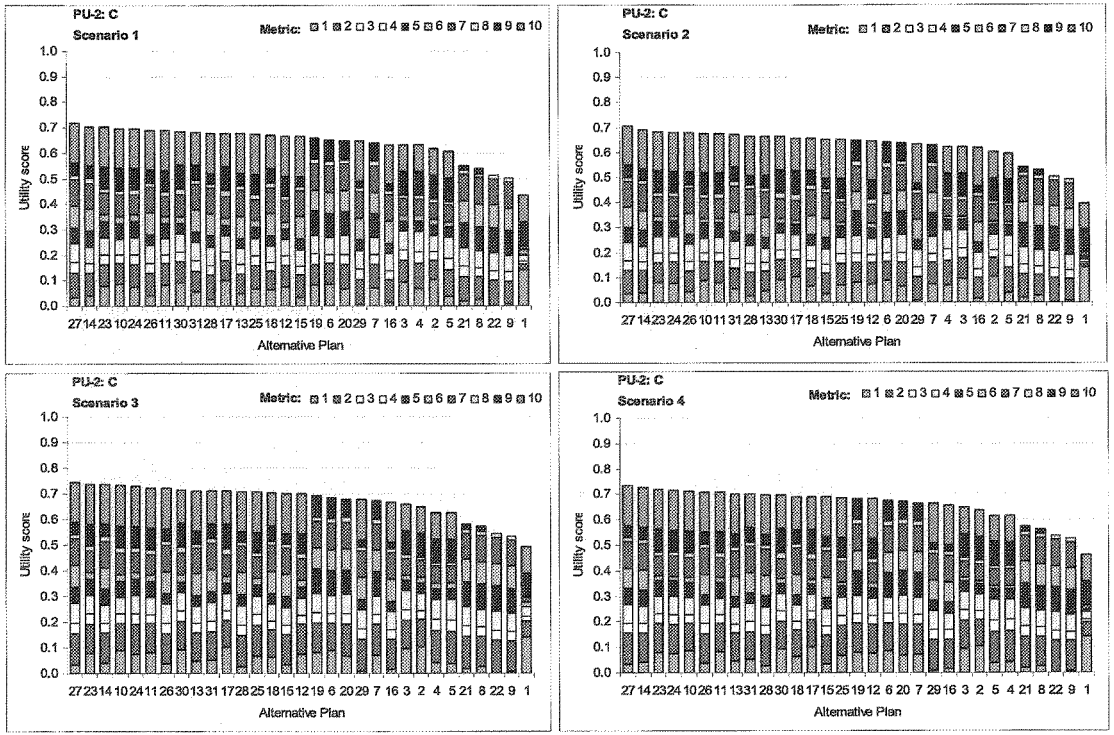


Figure 22. Contributions of Each Metric to the Multi-attribute Utility Score for Preference Pattern C by Scenario for PU-2.



6.3.1 Sensitivity of Preferred Alternatives – Planning Unit 2

Table 22 shows the preferred alternatives over four possible relative sea level rise and re-development scenarios. Each cell indicates the preferred alternative given the scenario and the coastal alternative. For example, for PU-2:A, plan PU2-C-WBI-100-1 (Plan 30) is preferred regardless of rate of relative sea level rise and pattern of development. This table shows that this pattern also holds for Preference Patterns B and C, where plan PU2-C-G-100-4 (Plan 20) and plan PU2-C-R-400-3 (Plan 27) are preferred, respectively.

Table 22. Preferred Plan Matrix for Three Preference Patterns in PU2.

PU-2:A	Relative Sea-level Rise	
Pattern of Development	Lower	Higher
High/Dispersed	PU2-C-WBI-100-1	PU2-C-WBI-100-1
BAU/Compact	PU2-C-WBI-100-1	PU2-C-WBI-100-1

PU-2:B	Relative Sea-level Rise	
Pattern of Development	Lower	Higher
High/Dispersed	PU2-C-G-100-4	PU2-C-G-100-4
BAU/Compact	PU2-C-G-100-4	PU2-C-G-100-4

PU-2:C	Relative Sea-level Rise	
Pattern of Development	Lower	Higher
High/Dispersed	PU2-C-R-400-3	PU2-C-R-400-3
BAU/Compact	PU2-C-R-400-3	PU2-C-R-400-3

6.3.2 Expected Utility – Planning Unit 2

Figures 23 through 25 plot the expected utility of each alternative assuming a uniform distribution of probability across the two relative sea level rise scenarios (P(RSLR = Lower) = 0.5 and P(RSLR = Higher) = 0.5) for each preference pattern. These three figures illustrate the expected utility of each alternative assuming a High Employment and Dispersed Population scenario. (BAU/Compact was not generated.) These figures illustrate how the utility of some alternatives may be more or less sensitive to relative sea level rise assumptions than the utility of other alternatives. The error bands on expected utility represent the minimum and maximum levels of

utility over the four scenarios considered in the LACPR plan. Alternatives with more sensitivity to relative sea level rise and development assumptions will have wider error bands than those with less sensitivity. Alternatives that have narrower error bands can be judged to be more predictable in terms of the level of utility they will provide. For example, Plan 4 has a narrow error band for PU-2:A (Figure 23). The expected utility of any given alternative and its range of possible values depends in part upon what set of weights is chosen to calculate utility.

The calculation of expected utility requires the assignment of probability to each scenario, but in this case our interest is not in any particular set of probabilities. Rather, our interest is in understanding how the different alternatives perform under different allocations of probability to the scenarios. For example, a change in the probabilities might cause expected utility for some alternatives to increase while causing expected utility for other alternatives to decrease. We are also interested in the range of expected utility for each scenario. The expected utilities shown in these figures assume high employment/dispersed populations. Alternatives that have expected utilities with smaller ranges represent more predictable outcomes. These alternatives (for example, Plan 4 in Figure 23) may be preferred to others that have larger ranges (for example, Plan 17 in Figure 23) because these alternatives lead to more predictable outcomes.

Figure 23. Expected Utility of each PU-2 Alternative for Preference Pattern A, showing minimum and maximum utility scores (Scenarios 1 & 2: High Employment/ Dispersed Population).

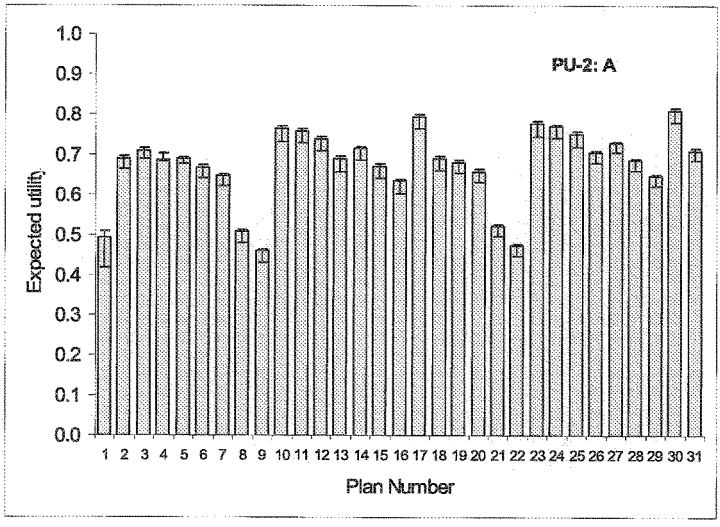


Figure 24. Expected Utility of each PU-2 Alternative for Preference Pattern B, showing minimum and maximum utility scores. (Scenarios 1 & 2: High Employment/ Dispersed Population).

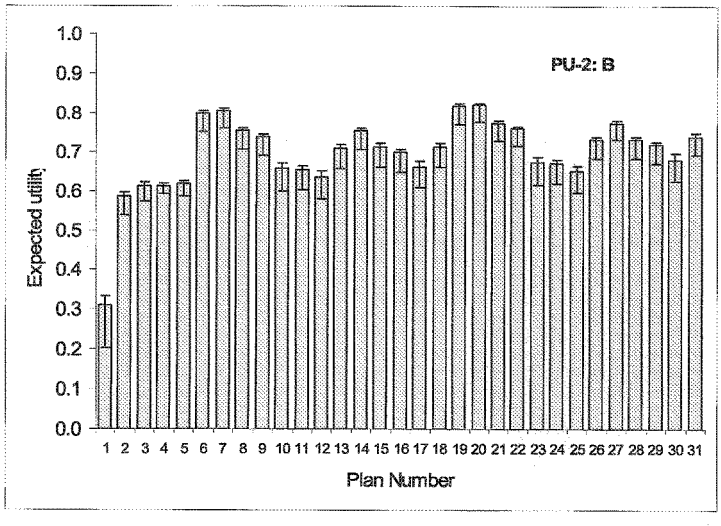
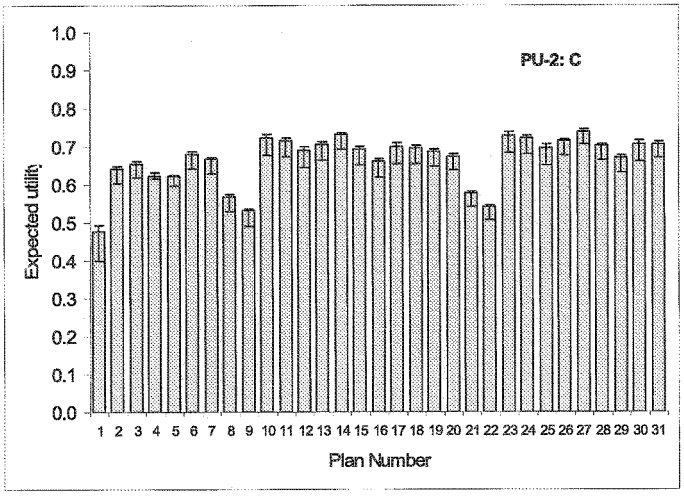


Figure 25. Expected Utility of each PU-2 Alternative for Preference Pattern C, showing minimum and maximum utility scores. (Scenarios 1 & 2: High Employment/ Dispersed Population).



6.3.3 Sensitivity of Decisions to Assumptions about the Probability of Higher Levels of Relative Sea Level Rise – Planning Unit 2

Table 23 shows the sensitivity of the preferred alternative to assumptions about the allocation of probabilities to relative sea level rise scenarios for each of the three preference patterns and for each development scenario. For PU-2:A, the decision is insensitive for all scenarios, with Plan 30 being preferred. For stakeholders with preferences that are consistent with those of PU-2:B, the plan that maximizes expected utility is Plan 20. For stakeholders with preferences that are consistent with those of PU-2:C, the plan that maximizes expected utility is Plan 27.

Table 23. Preferred Plan Matrix for PU2.

PU-2: A	Probability (RSLR = Higher)										
Development Scenario	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
High Employment/ Dispersed Population (Scenarios 1&2)	30	30	30	30	30	30	30	30	30	30	30
BAU Employment/Compact Population (Scenarios 3&4)	30	30	30	30	30	30	30	30	30	30	30

PU-2: B	Probability (RSLR = Higher)										
Development Scenario	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
High Employment/ Dispersed Population (Scenarios 1&2)	20	20	20	20	20	20	20	20	20	20	20
BAU Employment/Compact Population (Scenarios 3&4)	20	20	20	20	20	20	20	20	20	20	20

PU-2: C	Probability (RSLR = Higher)										
Development Scenario	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
High Employment/ Dispersed Population (Scenarios 1&2)	27	27	27	27	27	27	27	27	27	27	27
BAU Employment/Compact Population (Scenarios 3&4)	27	27	27	27	27	27	27	27	27	27	27

6.4 Results for Illustrative Preference Patterns – Planning Unit 3a

MAU scores were calculated for each of the coastal, structural, and nonstructural plans and the no-action alternative for three illustrative preference patterns selected for this discussion (Table 24). Figure 26 shows the proportion of total weight placed on each of the metrics. Preference pattern PU-3a:A put the highest weight on minimizing indirect environmental impact (IEI) and minimizing life-cycle costs (COST). Preference pattern PU-3a:B put the highest weight on minimizing population impacts (POP) and direct economic damages (DAM). Preference pattern PU-3a:C differs from the other two because a high weight is placed on minimizing construction time (TIME). PU-3a:C also values minimizing population impacts (POP) employment impacts (EMP) and direct wetland impacts (DWI).

Table 24. Swing weights for three illustrative preference patterns discussed for PU3a.

#	Code	Name	PU-3a:A	PU-3a:B	PU-3a:C
1	COST	Life-cycle Cost ($ Billions)	0.2679	0.0250	0.0215
2	POP	Population Impacted (People/Year)	0.0893	0.2500	0.1613
3	DAM	Direct Economic Damages ($ Millions/Year)	0.0893	0.2250	0.1075
4	EMP	Employment Impacts (Jobs Disrupted/Year)	0.0357	0.1750	0.1613
5	ASIT	Archeological Sites Protected (Number of Sites)	0.0000	0.0500	0.0215
6	HDIS	Historic Districts Protected (Number of Districts)	0.0000	0.0500	0.0215
7	HPRO	Historic Properties Protected (Number of Properties)	0.0357	0.0500	0.0215
8	TIME	Construction Time (Years)	0.0357	0.1250	0.2151
9	DWI	Direct Wetland Impacts (Acres)	0.0893	0.0250	0.1613
10	IEI	Indirect Environmental Impacts (Scale; -8 to +8)	0.3571	0.0250	0.1075
		Top-ranked metric	IEI	POP	TIME

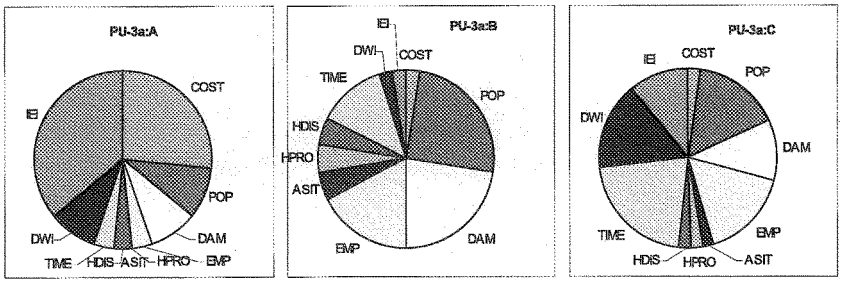
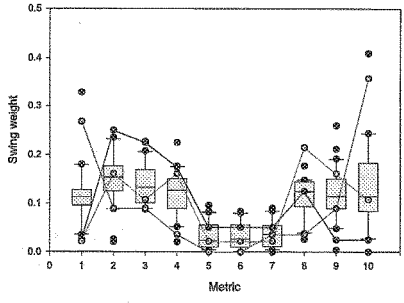


Figure 26. Three illustrative preference patterns discussed for PU3a.

The illustrative preference patterns selected for discussion here are each unique within the planning unit, but they are not necessarily atypical. Usually, a preference pattern contains some weights that are similar to those of other stakeholders and some weights that represent extremes. Figure 27 shows how each of the swing weights in the illustrative preference pattern compares to the other swing weights in this planning unit. In this figure, the three color-coded sets of weights are overlaid on the box plots that were introduced in Section 3. The closer each of the color-coded points is to being within the gray box for a particular performance measure, the more typical the weight. Points that fall outside the error bars that surround the gray box indicate extreme positions relative to other survey respondents, or outliers. For example, PU-3a:A, shown in red, takes extreme positions on several objectives, placing much more weight on minimizing cost (COST) and minimizing direct environmental impacts (IEI) than other survey respondents and less weight on several other objectives. PU-3a:B, shown in blue, is an outlier with respect to its relatively low weight on minimizing cost (COST), direct wetland impacts (DWI), indirect environmental impacts (IEI) and its relatively high weight on minimizing population impacts (POP), direct economic damages (DAM), and employment impacts (EMP). PU-3a:C is perhaps more typical of other survey respondents, although this survey respondent is an outlier with respect to the low weight on minimizing cost (COST) and the high weight on minimizing the amount of construction time (TIME).



#	Code	Metric Name
1	COST	Life-cycle Cost ($ Billions)
2	POP	Population Impacted (People/Year)
3	DAM	Direct Economic Damages ($ Millions/Year)
4	EMP	Employment Impacts (Jobs Disrupted/Year)
5	ASIT	Archeological Sites Protected (Number of Sites)
6	HDIS	Historic Districts Protected (Number of Districts)
7	HPRO	Historic Properties Protected (Number of Properties)
8	TIME	Construction Time (Years)
9	DWI	Direct Wetland Impacts (Acres)
10	IEI	Indirect Environmental Impacts (Scale; -8 to +8)

Figure 27. Swing weights for the three preference patterns evaluated for PU3a superimposed on the weight elicitation results summarized in Figure 1. The swing weights of three individual stakeholders represent illustrative preference patterns designated as PU-3a:A (red), PU-3a:B (blue), and PU-3a:C (green).

These three illustrative preference patterns produce a unique rank order of plans. These rank orders are illustrated in Figure 28 for each of the preference patterns. The underlying table was introduced in Section 5 and shows the number of times that each plan ranked first, second, third, fourth, or fifth when plans were ranked in decreasing order by the utility score. The top five plans for PU-3a:A are marked in red. The top-ranked plan for PU-3a:B is the no-action alternative (PU3a-0). This is followed by the non-structural (PU3a-NS-100, PU3a-NS-400, and PU3a-NS-1000) and coastal alternatives (PU3a-R1) in positions two through five. The top-ranked plans for PU-3a:B are structural alternatives and the top-ranked plan is the GIWW/Morganza/Ring levee (C-G) alignment as its top-ranked plan. For PU-3a:C, the five top-ranked plans include the three non-structural plans and two structural plans. These results are presented here to illustrate that different sets of weights lead to different rankings of plans. While the rankings suggest order of preference, they do not indicate how much more or less preferred a plan is relative to other plans. In addition, these figures do not help explain why a particular set of weights leads to a particular ranking of plans. These issues are discussed in greater detail below.

PU3a, Scenario 1						
PLAN CODE	Rank Based on Swing Weights					Total
	1	2	3	4	5	
PU3a-0	2	0	0	2	2	6
PU3a-C-G-1000-2	2	0	1	0	0	3
PU3a-C-G-400-2	0	1	1	0	0	2
PU3a-C-M-100-1	0	2	1	0	1	4
PU3a-C-M-100-2	0	0	3	17	3	23
PU3a-G-1000-2	0	0	0	0	2	2
PU3a-M-100-1	0	0	1	1	1	3
PU3a-M-100-2	0	0	0	3	14	17
PU3a-NS-100	0		21	1	3	26
PU3a-NS-1000	26	1	0	0	1	28
PU3a-NS-400	0	25	1	1	0	27
PU3a-R1	0	0	1	5	3	9
Total	30	30	30	30	30	150

Figure 28. Rank order of the top five plans for the illustrative preference patterns. The preference patters are color coded as follows: PU-3a:A is red, PU-3a:B is blue, and PU-3a:C is green.

MAU scores were calculated for each of the structural and nonstructural plans and the no-action alternative using a full set of ten weights and metrics. In the discussion of PU-3a results that follows, plans are numbered 1-13 as indicated in Table 25 to facilitate discussion.

Table 25. Plan Numbers and Plan Names for PU3a.

Plan	Plan Code
1	PU3a-0
2	PU3a-R1
3	PU3a-NS-100
4	PU3a-NS-400
5	PU3a-NS-1000
6	PU3a-M-100-1
7	PU3a-M-100-2
8	PU3a-G-400-2
9	PU3a-G-1000-2
10	PU3a-C-M-100-1
11	PU3a-C-M-100-2
12	PU3a-C-G-400-2
13	PU3a-C-G-1000-2

The 13 plans are ranked by MAU for each scenario and each of the three preference patterns in Tables 26 through 28. For example, Table 26 shows the utility of Plan 1 for PU1-3a under the planning assumptions used in Scenarios 1 and 3 is 0.810 and 0.824, respectively. Under the assumptions of Scenario 2 and 4, Plan 1 remains the top-ranked plan, but the utility score decreases to 0.784 and 0.802, respectively. The lower-levels of performance for this plan in Scenarios 2 and 4 can be attributed to the higher rates of sea-level rise assumed in these scenarios. For preference pattern PU-3a:B, the effect of higher rates of sea-level rise is to make a comprehensive 1000-year plan (PU3a-C-G-1000-2) more attractive than the no action plan. This shows sensitivity of the preferred plan to uncertainty in sea-level rise assumptions. For PU-3a:C, a non-structural plan (PU3a-NS-1000) dominates the rankings under all four scenarios, again showing sensitivity of the preferred plan to uncertainty in sea-level rise assumptions.

Figures 29 through 31 illustrate why different preference patterns might lead to different plan rankings by showing the contribution of each metric to utility for each plan, scenario, and preference pattern. For example, Figure 29 illustrates the contribution of each metric to utility for PU-3a:A. Under a set of planning assumptions consistent with Scenario 1 (Lower RSLR and High Employment/Dispersed Population), the utility of Plan 1 for PU-1:A is 0.810. This can be

attributed to the relative performance of this plan on those performance objectives that are important for this preference pattern. Although a plan may contribute substantially towards one of the performance objectives, if the weights reflect relatively little importance on that objective, the performance with respect to that objective will make little contribution towards the overall utility for this preference pattern.

For PU-3a:A, the top-ranked plan is the no action plan: Plan 1 (Table 26 and Figure 29). For this preference pattern, the rank order of all plans is not dependent upon scenario assumptions. The second and third-ranked plans for all scenarios were Plans 5 and 4 (non-structural). The two metrics most contributing to the MAU scores for PU-3a:A were life-cycle cost and indirect environmental impacts (Nos. 1 and 10).

The top ranking plans for PU-3a:B are those that include comprehensive plan (Plans 13, 10 and 12) (Table 27 and Figure 30). The rank order for all plans in this preference pattern was not sensitive to scenario assumptions. The metrics most contributing to MAU of the top-ranked plans were population impacts (No. 2) and economic damages (No. 3). Although a particular metric may make substantial contributions toward overall utility, performance metrics that do not vary among decision alternatives will tend to have little impact on plan rankings. This holds true for both population impacts and direct economic damages. Although these metrics contribute to the MAU score, they have little influence on the ranking of structural and nonstructural alternatives because they do not vary. The metric most contributing to the MAU score of the top-ranked plan for PU-3a:B was historic districts protected (No. 7).

For PU-3a:C, the two top-ranking plans are those that include nonstructural measures (Plans 5 and 4) (Table 28 and Figure 31). For this group, the rank order of the top two plans is not dependent upon scenario assumptions. Metrics most contributing to the MAU scores for these two top-ranked plans in PU-3a:C were population (No. 2) and economic impacts (No. 3) and impacts to employment (No. 4).

Table 26. Plans Ranked by Multi-attribute Utility Score for PU-3a, Preference Pattern A.

PU-3a: A

	Scenario 1	
Plan	*Plan Code*	*Utility*
1	PU3a-0	0.810
5	PU3a-NS-1000	0.749
4	PU3a-NS-400	0.744
3	PU3a-NS-100	0.736
2	PU3a-R1	0.719
11	PU3a-C-M-100-2	0.468
7	PU3a-M-100-2	0.467
10	PU3a-C-M-100-1	0.300
6	PU3a-M-100-1	0.298
12	PU3a-C-G-400-2	0.288
8	PU3a-G-400-2	0.286
9	PU3a-G-1000-2	0.259
13	PU3a-C-G-1000-2	0.257

	Scenario 2	
Plan	*Plan Code*	*Utility*
1	PU3a-0	0.783644
5	PU3a-NS-1000	0.740505
4	PU3a-NS-400	0.734326
3	PU3a-NS-100	0.720308
2	PU3a-R1	0.689992
11	PU3a-C-M-100-2	0.459283
7	PU3a-M-100-2	0.457755
10	PU3a-C-M-100-1	0.291065
6	PU3a-M-100-1	0.289664
12	PU3a-C-G-400-2	0.280255
8	PU3a-G-400-2	0.277597
9	PU3a-G-1000-2	0.249946
13	PU3a-C-G-1000-2	0.248987

	Scenario 3	
Plan	*Plan Code*	*Utility*
1	PU3a-0	0.824
5	PU3a-NS-1000	0.753
4	PU3a-NS-400	0.752
3	PU3a-NS-100	0.745
2	PU3a-R1	0.733
11	PU3a-C-M-100-2	0.473
7	PU3a-M-100-2	0.472
10	PU3a-C-M-100-1	0.305
6	PU3a-M-100-1	0.303
12	PU3a-C-G-400-2	0.292
8	PU3a-G-400-2	0.292
9	PU3a-G-1000-2	0.264
13	PU3a-C-G-1000-2	0.261

	Scenario 4	
Plan	*Plan Code*	*Utility*
1	PU3a-0	0.802
5	PU3a-NS-1000	0.746
4	PU3a-NS-400	0.744
3	PU3a-NS-100	0.732
2	PU3a-R1	0.709
11	PU3a-C-M-100-2	0.465
7	PU3a-M-100-2	0.464
10	PU3a-C-M-100-1	0.296
6	PU3a-M-100-1	0.295
12	PU3a-C-G-400-2	0.284
8	PU3a-G-400-2	0.284
9	PU3a-G-1000-2	0.256
13	PU3a-C-G-1000-2	0.253

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Table 27. Plans Ranked by Multi-attribute Utility Score for PU-3a, Preference Pattern B.

PU-3a: B

	Scenario 1	
Plan	*Plan Code*	*Utility*
13	PU3a-C-G-1000-2	0.803
10	PU3a-C-M-100-1	0.786
12	PU3a-C-G-400-2	0.780
6	PU3a-M-100-1	0.774
9	PU3a-G-1000-2	0.771
11	PU3a-C-M-100-2	0.768
7	PU3a-M-100-2	0.754
8	PU3a-G-400-2	0.750
5	PU3a-NS-1000	0.719
4	PU3a-NS-400	0.690
3	PU3a-NS-100	0.619
2	PU3a-R1	0.452
1	PU3a-0	0.351

	Scenario 2	
Plan	*Plan Code*	*Utility*
13	PU3a-C-G-1000-2	0.785208
10	PU3a-C-M-100-1	0.765622
12	PU3a-C-G-400-2	0.758752
6	PU3a-M-100-1	0.753184
9	PU3a-G-1000-2	0.749743
11	PU3a-C-M-100-2	0.742259
7	PU3a-M-100-2	0.728632
8	PU3a-G-400-2	0.726425
5	PU3a-NS-1000	0.700354
4	PU3a-NS-400	0.667194
3	PU3a-NS-100	0.578847
2	PU3a-R1	0.369497
1	PU3a-0	0.266757

	Scenario 3	
Plan	*Plan Code*	*Utility*
13	PU3a-C-G-1000-2	0.816
10	PU3a-C-M-100-1	0.799
12	PU3a-C-G-400-2	0.794
6	PU3a-M-100-1	0.788
9	PU3a-G-1000-2	0.785
11	PU3a-C-M-100-2	0.782
7	PU3a-M-100-2	0.768
8	PU3a-G-400-2	0.765
5	PU3a-NS-1000	0.734
4	PU3a-NS-400	0.710
3	PU3a-NS-100	0.645
2	PU3a-R1	0.491
1	PU3a-0	0.391

	Scenario 4	
Plan	*Plan Code*	*Utility*
13	PU3a-C-G-1000-2	0.800
10	PU3a-C-M-100-1	0.780
12	PU3a-C-G-400-2	0.774
6	PU3a-M-100-1	0.768
9	PU3a-G-1000-2	0.766
11	PU3a-C-M-100-2	0.758
7	PU3a-M-100-2	0.745
8	PU3a-G-400-2	0.743
5	PU3a-NS-1000	0.719
4	PU3a-NS-400	0.691
3	PU3a-NS-100	0.612
2	PU3a-R1	0.423
1	PU3a-0	0.320

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Table 28. Plans Ranked by Multi-attribute Utility Score for PU-3a, Preference Pattern C.

PU-3a: C

	Scenario 1	
Plan	*Plan Code*	*Utility*
5	PU3a-NS-1000	0.788
4	PU3a-NS-400	0.768
3	PU3a-NS-100	0.718
11	PU3a-C-M-100-2	0.710
7	PU3a-M-100-2	0.702
10	PU3a-C-M-100-1	0.663
6	PU3a-M-100-1	0.656
12	PU3a-C-G-400-2	0.653
13	PU3a-C-G-1000-2	0.635
8	PU3a-G-400-2	0.633
9	PU3a-G-1000-2	0.613
2	PU3a-R1	0.609
1	PU3a-0	0.462

	Scenario 2	
Plan	*Plan Code*	*Utility*
5	PU3a-NS-1000	0.774713
4	PU3a-NS-400	0.752799
11	PU3a-C-M-100-2	0.694004
3	PU3a-NS-100	0.691817
7	PU3a-M-100-2	0.686278
10	PU3a-C-M-100-1	0.650351
6	PU3a-M-100-1	0.643267
12	PU3a-C-G-400-2	0.64016
13	PU3a-C-G-1000-2	0.62327
8	PU3a-G-400-2	0.617918
9	PU3a-G-1000-2	0.599176
2	PU3a-R1	0.554537
1	PU3a-0	0.407701

	Scenario 3	
Plan	*Plan Code*	*Utility*
5	PU3a-NS-1000	0.797
4	PU3a-NS-400	0.780
3	PU3a-NS-100	0.735
11	PU3a-C-M-100-2	0.718
7	PU3a-M-100-2	0.711
10	PU3a-C-M-100-1	0.671
6	PU3a-M-100-1	0.664
12	PU3a-C-G-400-2	0.661
13	PU3a-C-G-1000-2	0.643
8	PU3a-G-400-2	0.642
2	PU3a-R1	0.635
9	PU3a-G-1000-2	0.622
1	PU3a-0	0.488

	Scenario 4	
Plan	*Plan Code*	*Utility*
5	PU3a-NS-1000	0.787
4	PU3a-NS-400	0.768
3	PU3a-NS-100	0.713
11	PU3a-C-M-100-2	0.704
7	PU3a-M-100-2	0.697
10	PU3a-C-M-100-1	0.659
6	PU3a-M-100-1	0.653
12	PU3a-C-G-400-2	0.650
13	PU3a-C-G-1000-2	0.633
8	PU3a-G-400-2	0.628
9	PU3a-G-1000-2	0.609
2	PU3a-R1	0.588
1	PU3a-0	0.441

Figure 29. Contributions of Each Metric to the Multi-attribute Utility Score for Preference Pattern A by Scenario for PU-3a.

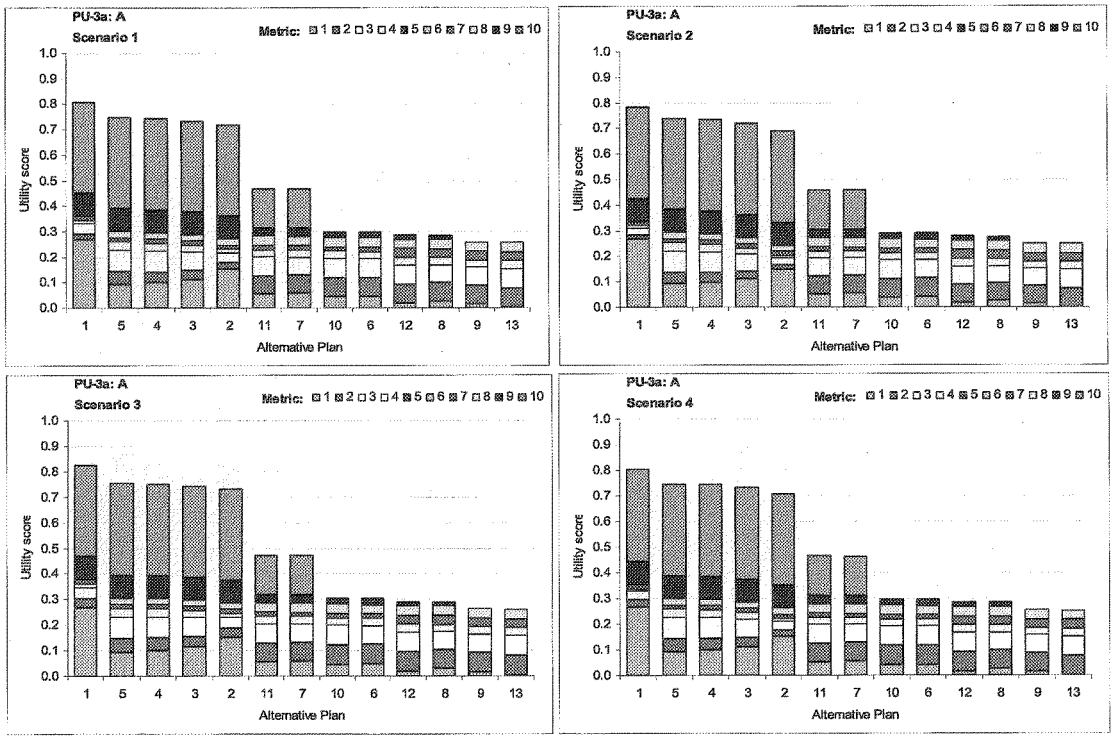

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Figure 30. Contributions of Each Metric to the Multi-attribute Utility Score for Preference Pattern B by Scenario for PU-3a.

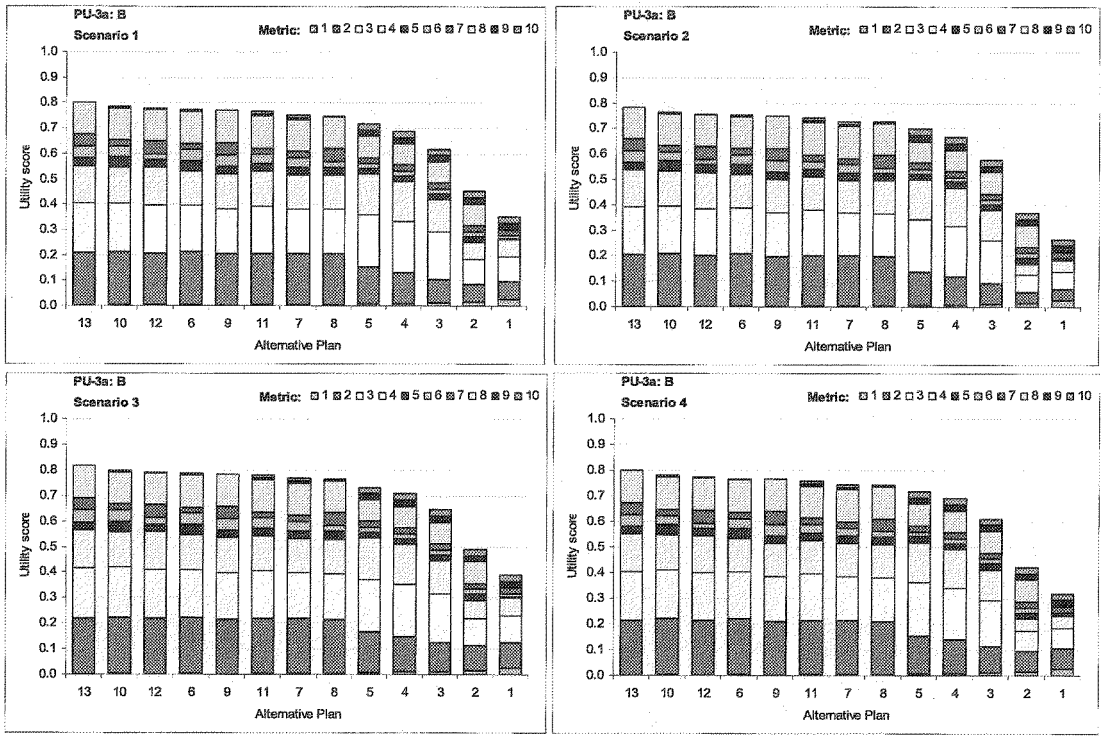
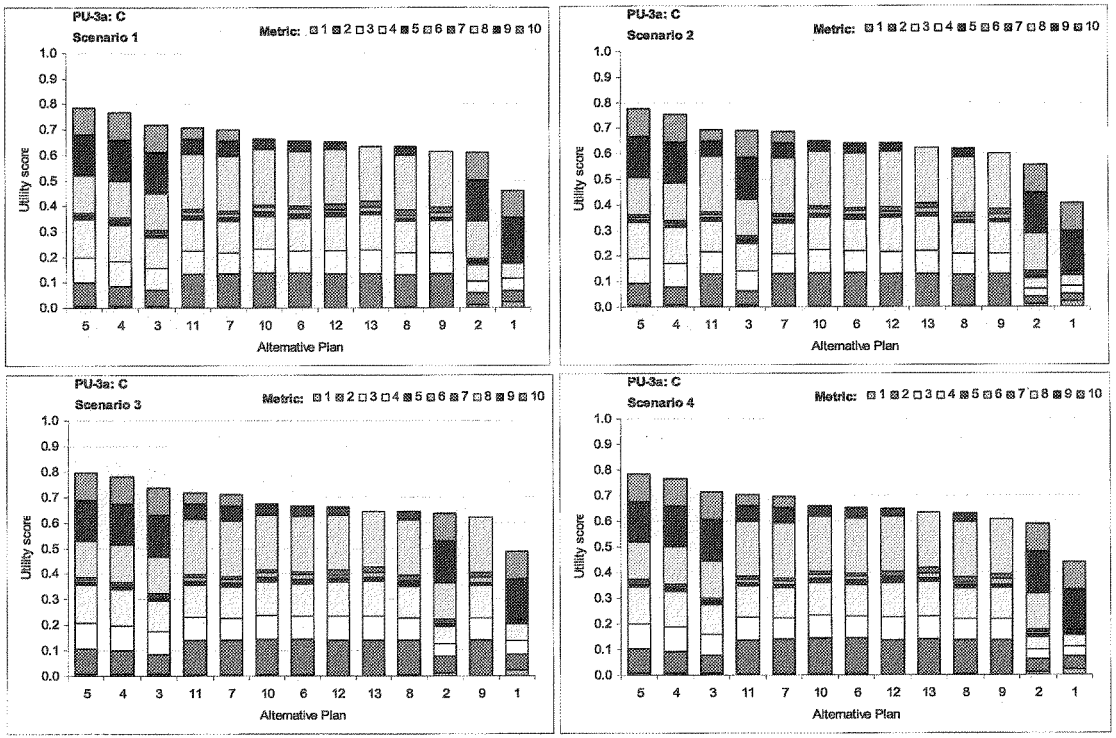


Figure 31. Contributions of Each Metric to the Multi-attribute Utility Score for Preference Pattern C by Scenario for PU-3a.



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6.4.1 Sensitivity of Preferred Alternatives – Planning Unit 3a

Table 29 shows the preferred alternatives over four possible relative sea level rise and re-development scenarios. Each cell indicates the preferred alternative given the scenario and the coastal alternative. For example, for PU-3a:A, plan PU3a-0 (Plan 1) is preferred regardless of rate of relative sea level rise and pattern of development. For PU-3a:B and PU-3a:C, plan PU3a-C-G-1000-2 (Plan 13) and plan PU3a-NS-1000 (Plan 5) are preferred, respectively, regardless of rate of relative sea level rise and pattern of development.

Table 29. Preferred Plan Matrix for Three Preference Patterns in PU3a.

PU-3a:A	Relative Sea-level Rise	
Pattern of Development	Lower	Higher
High/Dispersed	PU3a-0	PU3a-0
BAU/Compact	PU3a-0	PU3a-0

PU-3a:B	Relative Sea-level Rise	
Pattern of Development	Lower	Higher
High/Dispersed	PU3a-C-G-1000-2	PU3a-C-G-1000-2
BAU/Compact	PU3a-C-G-1000-2	PU3a-C-G-1000-2

PU-3a:C	Relative Sea-level Rise	
Pattern of Development	Lower	Higher
High/Dispersed	PU3a-NS-1000	PU3a-NS-1000
BAU/Compact	PU3a-NS-1000	PU3a-NS-1000

6.4.2 Expected Utility – Planning Unit 3a

Figures 32 through 34 plot the expected utility of each alternative assuming a uniform distribution of probability across the two relative sea level rise scenarios (P(RSLR = Lower) = 0.5 and P(RSLR = Higher) = 0.5) for each preference pattern. These three figures illustrate the expected utility of each alternative assuming a High Employment and Dispersed Population scenario. (BAU/Compact was not generated.) These figures illustrate how the utility of some alternatives

may be more or less sensitive to relative sea level rise assumptions than the utility of other alternatives. The error bands on expected utility represent the minimum and maximum levels of utility over the four scenarios considered in the LACPR plan. Alternatives with more sensitivity to relative sea level rise and development assumptions will have wider error bands than those with less sensitivity. Alternatives that have narrower error bands can be judged to be more predictable in terms of the level of utility they will provide. For example, Plans 4 and 5 have narrow error bands for PU-3a:A (Figure 32). The expected utility of any given alternative and its range of possible values depends in part upon what set of weights is chosen to calculate utility.

The calculation of expected utility requires the assignment of probability to each scenario, but in this case our interest is not in any particular set of probabilities. Rather, our interest is in understanding how the different alternatives perform under different allocations of probability to the scenarios. For example, a change in the probabilities might cause expected utility for some alternatives to increase while causing expected utility for other alternatives to decrease. We are also interested in the range of expected utility for each scenario. The expected utilities shown in these figures assume high employment/dispersed populations. Alternatives that have expected utilities with smaller ranges represent more predictable outcomes. These alternatives (for example, Plan 5 in Figure 32) may be preferred to others that have larger ranges (for example, Plan 1 in Figure 32) because these alternatives lead to more predictable outcomes.

Figure 32. Expected Utility of each PU-3a Alternative for Preference Pattern A, showing minimum and maximum utility scores (Scenarios 1 & 2: High Employment/ Dispersed Population).

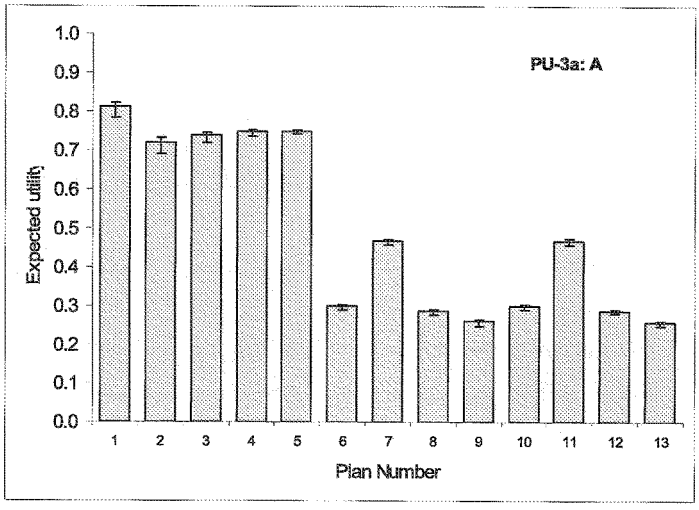


Figure 33. Expected Utility of each PU-3a Alternative for Preference Pattern B, showing minimum and maximum utility scores. (Scenarios 1 & 2: High Employment/ Dispersed Population).

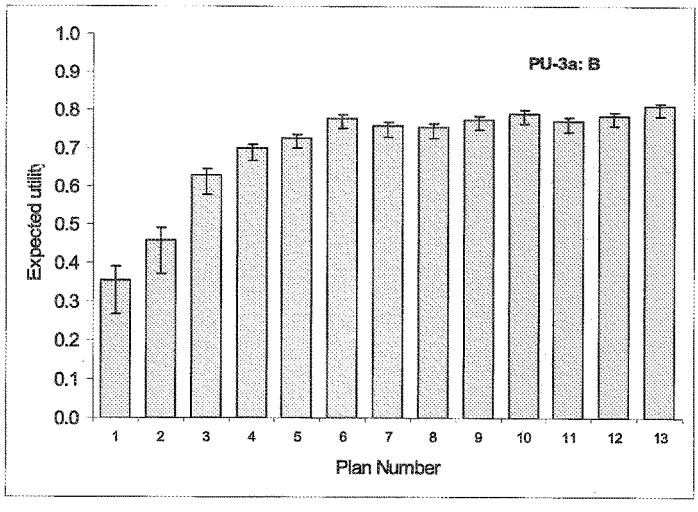
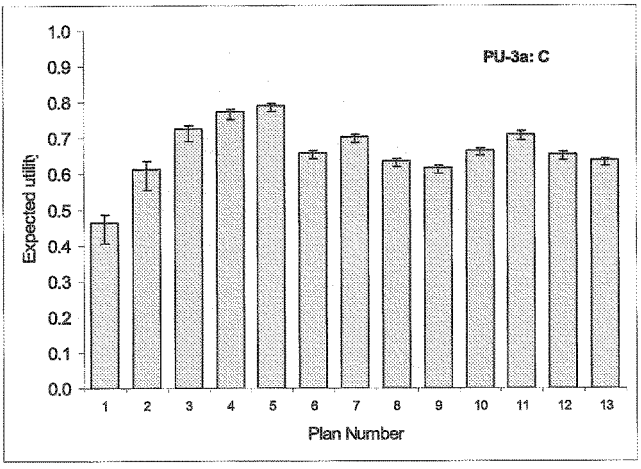


Figure 34. Expected Utility of each PU-3a Alternative for Preference Pattern C, showing minimum and maximum utility scores. (Scenarios 1 & 2: High Employment/ Dispersed Population).



6.4.3 Sensitivity of Decisions to Assumptions about the Probability of Higher Levels of Relative Sea Level Rise – Planning Unit 3a

Table 30 shows the sensitivity of the preferred alternative to assumptions about the allocation of probabilities to relative sea level rise scenarios for each of the three preference patterns and for each development scenario. For PU-3a:A, the decision is insensitive for all scenarios, with Plan 1 being preferred. Likewise, for PU-3a:B and PU-3a:C, the decision is insensitive for all scenarios, with Plans 13 and 5 being preferred, respectively.

Table 30. Preferred Plan Matrix for PU-3a.

PU-3a: A	Probability (RSLR = Higher)										
Development Scenario	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
High Employment/ Dispersed Population (Scenarios 1&2)	1	1	1	1	1	1	1	1	1	1	1
BAU Employment/Compact Population (Scenarios 3&4)	1	1	1	1	1	1	1	1	1	1	1

PU-3a: B	Probability (RSLR = Higher)										
Development Scenario	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
High Employment/ Dispersed Population (Scenarios 1&2)	13	13	13	13	13	13	13	13	13	13	13
BAU Employment/Compact Population (Scenarios 3&4)	13	13	13	13	13	13	13	13	13	13	13

PU-3a: C	Probability (RSLR = Higher)										
Development Scenario	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
High Employment/ Dispersed Population (Scenarios 1&2)	5	5	5	5	5	5	5	5	5	5	5
BAU Employment/Compact Population (Scenarios 3&4)	5	5	5	5	5	5	5	5	5	5	5

6.5 Results for Illustrative Preference Patterns – Planning Unit 3b

MAU scores were calculated for each of the coastal, structural, and nonstructural plans and the no-action alternative for three illustrative preference patterns selected for discussion (Table 31). Figure 35 shows the proportion of total weight placed on each of the metrics. Preference pattern PU-3b:A put the highest weight on minimizing direct wetland impacts (DWI) and indirect environmental impact (IEI), but also places a high importance on minimizing life-cycle project costs (COST) and residual risks to the resident population (POP), and reducing direct economic damages (DAM) and the length of time to construct a protection system (TIME). PU-3b:B puts the highest weight on minimizing residual risks to the resident population (POP), but also places high importance on reducing direct economic damages (DAM) and minimizing employment impacts (EMP), and maximizing the number of historic properties protected (HDIS). PU-3b:B places the least importance on minimizing impacts to archeological sites (ASIT). In contrast, the PU-3b:C preference pattern places the most importance on minimizing construction time (TIME). This pattern also values minimizing direct wetland impacts (DWI), indirect environmental impacts (IEI) and life-cycle costs. PU-3b:C places little importance on protecting historic districts, historic properties, and archeological sites (HDIS, HPRO and ASIT, respectively).

Table 31. Swing weights for three illustrative preference patterns discussed for PU3b.

#	Code	Name	PU-3b:A	PU-3b:A	PU-3b:C
1	COST	Life-cycle Cost ($ Billions)	0.1104	0.0612	0.1376
2	POP	Population Impacted (People/Year)	0.1004	0.2041	0.1193
3	DAM	Direct Economic Damages ($ Millions/Year)	0.1129	0.1837	0.0642
4	EMP	Employment Impacts (Jobs Disrupted/Year)	0.0878	0.1633	0.0917
5	ASIT	Archeological Sites Protected (Number of Sites)	0.0753	0.0204	0.0275
6	HDIS	Historic Districts Protected (Number of Districts)	0.0778	0.0816	0.0275
7	HPRO	Historic Properties Protected (Number of Properties)	0.0828	0.102	0.0275
8	TIME	Construction Time (Years)	0.1066	0.0612	0.1835
9	DWI	Direct Wetland Impacts (Acres)	0.1255	0.0816	0.1651
10	IEI	Indirect Environmental Impacts (Scale; -8 to +8)	0.1205	0.0408	0.156
		Top-ranked metric	DWI	POP	TIME

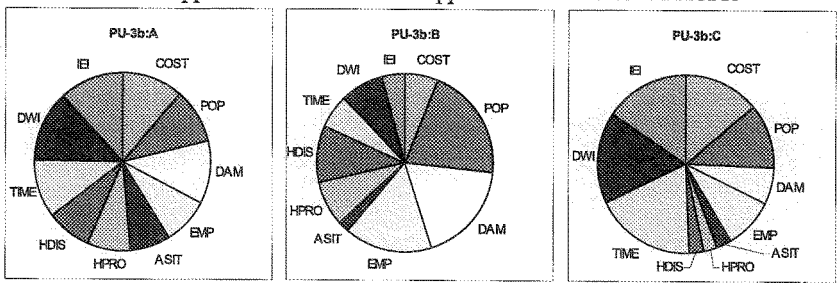
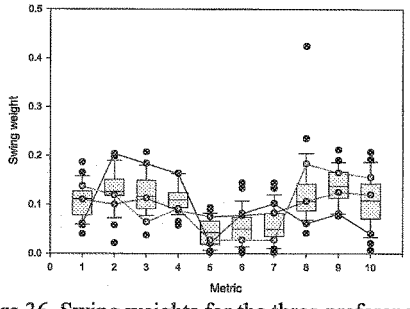


Figure 35. Three illustrative preference patterns discussed for PU3b.

The illustrative preference patterns selected for discussion here are each unique within the planning unit, but they are not necessarily atypical. Usually, a preference pattern contains some weights that are similar to those of other stakeholders and some weights that represent extremes. Figure 36 shows how each of the swing weights in the illustrative preference pattern compares to the other swing weights in this planning unit. In this figure, the three color-coded sets of weights are overlaid on the box plots that were introduced in Section 3. The closer each of the color-coded points is to being within the gray box for a particular performance measure, the more typical the weight. Points that fall outside the error bars that surround the gray box indicate extreme positions relative to other survey respondents, or outliers.



#	Code	Metric Name
1	COST	Life-cycle Cost ($ Billions)
2	POP	Population Impacted (People/Year)
3	DAM	Direct Economic Damages ($ Millions/Year)
4	EMP	Employment Impacts (Jobs Disrupted/Year)
5	ASIT	Archeological Sites Protected (Number of Sites)
6	HDIS	Historic Districts Protected (Number of Districts)
7	HPRO	Historic Properties Protected (Number of Properties)
8	TIME	Construction Time (Years)
9	DWI	Direct Wetland Impacts (Acres)
10	IEI	Indirect Environmental Impacts (Scale; -8 to +8)

Figure 36. Swing weights for the three preference patterns evaluated for PU3b superimposed on the weight elicitation results summarized in Figure 1. The swing weights of three individual stakeholders represent illustrative preference patterns designated as PU-3b:A (red), PU-3b:B (blue), and PU-3b:C (green).

These three illustrative preference patterns produce a unique rank order of plans. These rank orders are illustrated in Figure 37 for each of the preference patterns. The underlying table was introduced in Section 5 and shows the number of times that each plan ranked first, second, third, fourth, or fifth when plans were ranked in decreasing order by the utility score. For example, the top five plans for PU-3b:A are marked in red. The 100-year comprehensive Franklin to Abbeville (C-F) alignment (PU3b-C-F-100-1) is the top-ranked plan. For PU-3b:B, the 100-year comprehensive GIWW (C-G) alignment (PU3b-C-G-100-1) is the top-ranked plan. For PU-3b:C, the 100-year comprehensive ring levee (C-RL) alignment (PU3b-C-RL-100-1) is the top-ranked plan. These results are presented here to illustrate that different sets of weights lead to different rankings of plans. While the rankings suggest order of preference, they do not indicate how much more or less preferred a plan is relative to other plans. In addition, these figures do not help explain why a particular set of weights leads to a particular ranking of plans. These issues are discussed in greater detail below.

PU3b, Scenario 1						
PLAN CODE	Rank Based on Swing Weights					Total
	1	2	3	4	5	
PU3b-C-F-100-1	5	5	7	1	6	24
PU3b-C-F-1000-1	0	0	0	1	0	1
PU3b-C-F-400-1	1	0	3	0	1	5
PU3b-C-G-100-1	6	1	3	1	1	12
PU3b-C-RL-100-1	12	5	2	2	0	21
PU3b-C-RL-400-1	0	0	1	4	6	11
PU3b-F-100-1	0	0	3	8	5	16
PU3b-F-1000-1	0	0	0	0	0	0
PU3b-F-400-1	0	1	0	2	0	3
PU3b-G-100-1	0	6	0	2	2	10
PU3b-NS-100	0	0	0	1	0	1
PU3b-NS-1000	1	2	0	0	3	6
PU3b-NS-400	0	1	1	1	0	3
PU3b-RL-100-1	0	4	5	2	1	12
Total	25	25	25	25	25	125

Figure 37. Rank order of the top five plans for the illustrative preference patterns. The preference patters are color coded as follows: PU-3b:A is red, PU-3b:B is blue, and PU-3b:C is green.

In the discussion of PU-3b results that follows, plans are numbered 1-17 to facilitate references in tables and figures (Table 32). Plans are ranked by MAU for each planning scenario and characteristic sets of preferences in Tables 35-37.

Table 32. Plan Numbers and Plan Names for PU3b.

Plan	*Plan Code*
1	PU3b-0
2	PU3b-R1
3	PU3b-NS-100
4	PU3b-NS-400
5	PU3b-NS-1000
6	PU3b-G-100-1
7	PU3b-F-100-1
8	PU3b-F-400-1
9	PU3b-F-1000-1
10	PU3b-RL-100-1
11	PU3b-RL-400-1
12	PU3b-C-G-100-1
13	PU3b-C-F-100-1
14	PU3b-C-F-400-1
15	PU3b-C-F-1000-1
16	PU3b-C-RL-100-1
17	PU3b-C-RL-400-1

The 17 plans are ranked by MAU for each scenario and each of the three preference patterns in Tables 33 through 35. For example, Table 33 shows the utility of the top-ranked plans (Plan 13 or Plan 16) for PU-3b:A under the planning assumptions used in Scenarios 1 and 3 is 0.719 and 0.725, respectively. Under the assumptions of Scenario 2 and 4, Plan 13 remains the top-ranked plan, but the utility score decreases to 0.705 and 0.710, respectively. The lower-levels of performance for this plan in Scenarios 2 and 4 can be attributed to the higher rates of sea-level rise assumed in these scenarios. This trend also holds for PU-3b:B and PU-3b:C, where Plans 12 and 16 remain the top-ranked plan under all four scenarios.

Figures 38 through 40 illustrate why different preference patterns might lead to different plan rankings by showing the contribution of each metric to utility for each plan, scenario, and preference pattern. For example, Figure 38 illustrates the contribution of each metric to utility for PU-3b:A. Under a set of planning assumptions consistent with Scenario 1 (Lower RSLR and High Employment/Dispersed Population), the utility of Plan 12 for PU-1:A is 0.719. This can be

attributed to the relative performance of this plan on those performance objectives that are important for this preference pattern. Although a plan may contribute substantially towards one of the performance objectives, if the weights reflect relatively little importance on that objective, the performance with respect to that objective will make little contribution towards the overall utility for this preference pattern.

For PU-3b:A, the top-ranked plans are those that include comprehensive plans consisting of both structural and non-structural measures: Plans 13 and 16 (Table 33 and Figure 38). For this group, the rank order of the top plans is dependent upon scenario assumptions. The second-ranked plan for Scenario 3 was Plan 13 (comprehensive). Metrics most influencing overall utility for Plan 13 are protection of archeological sites (No. 5), historic properties and historic districts (Nos. 5, 6 and 7). When Plan 16 is top-ranked, direct wetland impacts (No. 9) most contributes to overall utility.

The top ranking plans for PU-3b:B are those that include a combination of structural and non-structural plans (comprehensive; Plan 12, 6 and 14) (Table 34 and Figure 39). The rank order for the top five-ranked plans in this group was not sensitive to scenario assumptions. The metrics most contributing to MAU of the top two plans (Plans 12 and 6) were employment impacts (No. 4), economic impacts (No. 3) and population impacts (No. 2). Although a particular metric may make substantial contributions toward overall utility, performance metrics that do not vary among decision alternatives will tend to have little impact on plan rankings. This holds true for employment impacts (No. 4), economic impacts (No. 3) and population impacts (No. 2). Although these metrics contribute to the MAU score, they have little influence on the ranking of structural and nonstructural alternatives because they do not vary. The metric most influencing overall utility for Plan 12, the top-ranked plan, is direct wetland impacts (No. 9).

For PU-3b:C, the top-ranking plan is a comprehensive plan, including both structural and non-structural measures: Plan 16 (Table 35 and Figure 40). For this preference pattern, the rank order of the top five plans is not dependent upon scenario assumptions. Metrics most contributing to the MAU scores for Plans 12 and 6 in PU-3b:C were life-cycle costs (No. 1), construction time (No. 8), direct wetland impacts (No. 9) and indirect environmental impacts (No. 10). The metric most influencing overall utility for Plan 16, the top-ranked plan, is employment impacts (No. 4).

Table 33. Plans Ranked by Multi-attribute Utility Score for PU-3b, Preference Pattern A.

PU-3b: A

	Scenario 1	
Plan	*Plan Code*	*Utility*
13	PU3b-C-F-100-1	0.719
16	PU3b-C-RL-100-1	0.718
7	PU3b-F-100-1	0.707
12	PU3b-C-G-100-1	0.707
17	PU3b-C-RL-400-1	0.707
14	PU3b-C-F-400-1	0.705
10	PU3b-RL-100-1	0.701
6	PU3b-G-100-1	0.700
8	PU3b-F-400-1	0.692
11	PU3b-RL-400-1	0.685
5	PU3b-NS-1000	0.640
4	PU3b-NS-400	0.638
3	PU3b-NS-100	0.626
15	PU3b-C-F-1000-1	0.626
9	PU3b-F-1000-1	0.613
2	PU3b-R1	0.542
1	PU3b-0	0.481

	Scenario 2	
Plan	*Plan Code*	*Utility*
13	PU3b-C-F-100-1	0.705
16	PU3b-C-RL-100-1	0.697
12	PU3b-C-G-100-1	0.694
7	PU3b-F-100-1	0.694
14	PU3b-C-F-400-1	0.690
6	PU3b-G-100-1	0.687
17	PU3b-C-RL-400-1	0.682
10	PU3b-RL-100-1	0.680
8	PU3b-F-400-1	0.676
11	PU3b-RL-400-1	0.657
5	PU3b-NS-1000	0.638
4	PU3b-NS-400	0.635
3	PU3b-NS-100	0.615
15	PU3b-C-F-1000-1	0.611
9	PU3b-F-1000-1	0.597
2	PU3b-R1	0.519
1	PU3b-0	0.442

	Scenario 3	
Plan	*Plan Code*	*Utility*
16	PU3b-C-RL-100-1	0.725
13	PU3b-C-F-100-1	0.724
7	PU3b-F-100-1	0.712
12	PU3b-C-G-100-1	0.710
17	PU3b-C-RL-400-1	0.710
14	PU3b-C-F-400-1	0.709
10	PU3b-RL-100-1	0.708
6	PU3b-G-100-1	0.703
8	PU3b-F-400-1	0.696
11	PU3b-RL-400-1	0.692
4	PU3b-NS-400	0.644
5	PU3b-NS-1000	0.643
3	PU3b-NS-100	0.633
15	PU3b-C-F-1000-1	0.631
9	PU3b-F-1000-1	0.618
2	PU3b-R1	0.549
1	PU3b-0	0.488

	Scenario 4	
Plan	*Plan Code*	*Utility*
13	PU3b-C-F-100-1	0.710
16	PU3b-C-RL-100-1	0.705
7	PU3b-F-100-1	0.699
12	PU3b-C-G-100-1	0.698
14	PU3b-C-F-400-1	0.695
6	PU3b-G-100-1	0.690
10	PU3b-RL-100-1	0.688
17	PU3b-C-RL-400-1	0.685
8	PU3b-F-400-1	0.682
11	PU3b-RL-400-1	0.665
5	PU3b-NS-1000	0.642
4	PU3b-NS-400	0.641
3	PU3b-NS-100	0.622
15	PU3b-C-F-1000-1	0.616
9	PU3b-F-1000-1	0.602
2	PU3b-R1	0.526
1	PU3b-0	0.450

Table 34. Plans Ranked by Multi-attribute Utility Score for PU-3b, Preference Pattern B.

PU-3b: B

	Scenario 1	
Plan	*Plan Code*	*Utility*
12	PU3b-C-G-100-1	0.800
6	PU3b-G-100-1	0.786
14	PU3b-C-F-400-1	0.756
8	PU3b-F-400-1	0.732
13	PU3b-C-F-100-1	0.729
17	PU3b-C-RL-400-1	0.716
7	PU3b-F-100-1	0.708
16	PU3b-C-RL-100-1	0.697
15	PU3b-C-F-1000-1	0.697
11	PU3b-RL-400-1	0.675
9	PU3b-F-1000-1	0.671
10	PU3b-RL-100-1	0.665
5	PU3b-NS-1000	0.624
4	PU3b-NS-400	0.617
3	PU3b-NS-100	0.589
2	PU3b-R1	0.431
1	PU3b-0	0.414

	Scenario 2	
Plan	*Plan Code*	*Utility*
12	PU3b-C-G-100-1	0.782
6	PU3b-G-100-1	0.768
14	PU3b-C-F-400-1	0.735
8	PU3b-F-400-1	0.710
13	PU3b-C-F-100-1	0.709
7	PU3b-F-100-1	0.688
17	PU3b-C-RL-400-1	0.682
15	PU3b-C-F-1000-1	0.674
16	PU3b-C-RL-100-1	0.667
9	PU3b-F-1000-1	0.648
11	PU3b-RL-400-1	0.636
10	PU3b-RL-100-1	0.635
5	PU3b-NS-1000	0.617
4	PU3b-NS-400	0.607
3	PU3b-NS-100	0.566
2	PU3b-R1	0.385
1	PU3b-0	0.353

	Scenario 3	
Plan	*Plan Code*	*Utility*
12	PU3b-C-G-100-1	0.806
6	PU3b-G-100-1	0.792
14	PU3b-C-F-400-1	0.765
8	PU3b-F-400-1	0.741
13	PU3b-C-F-100-1	0.738
17	PU3b-C-RL-400-1	0.726
7	PU3b-F-100-1	0.717
16	PU3b-C-RL-100-1	0.709
15	PU3b-C-F-1000-1	0.705
11	PU3b-RL-400-1	0.688
9	PU3b-F-1000-1	0.681
10	PU3b-RL-100-1	0.678
5	PU3b-NS-1000	0.633
4	PU3b-NS-400	0.628
3	PU3b-NS-100	0.602
2	PU3b-R1	0.444
1	PU3b-0	0.427

	Scenario 4	
Plan	*Plan Code*	*Utility*
12	PU3b-C-G-100-1	0.788
6	PU3b-G-100-1	0.775
14	PU3b-C-F-400-1	0.744
8	PU3b-F-400-1	0.720
13	PU3b-C-F-100-1	0.719
7	PU3b-F-100-1	0.698
17	PU3b-C-RL-400-1	0.693
15	PU3b-C-F-1000-1	0.683
16	PU3b-C-RL-100-1	0.682
9	PU3b-F-1000-1	0.658
11	PU3b-RL-400-1	0.651
10	PU3b-RL-100-1	0.650
5	PU3b-NS-1000	0.627
4	PU3b-NS-400	0.619
3	PU3b-NS-100	0.579
2	PU3b-R1	0.399
1	PU3b-0	0.367

Table 35. Plans Ranked by Multi-attribute Utility Score for PU-3b, Preference Pattern C.

PU-3b: C

	Scenario 1	
Plan	*Plan Code*	*Utility*
16	PU3b-C-RL-100-1	0.786
10	PU3b-RL-100-1	0.774
13	PU3b-C-F-100-1	0.758
7	PU3b-F-100-1	0.750
17	PU3b-C-RL-400-1	0.726
5	PU3b-NS-1000	0.716
4	PU3b-NS-400	0.716
11	PU3b-RL-400-1	0.712
3	PU3b-NS-100	0.709
14	PU3b-C-F-400-1	0.673
8	PU3b-F-400-1	0.663
12	PU3b-C-G-100-1	0.649
6	PU3b-G-100-1	0.643
2	PU3b-R1	0.642
15	PU3b-C-F-1000-1	0.568
9	PU3b-F-1000-1	0.558
1	PU3b-0	0.536

	Scenario 2	
Plan	*Plan Code*	*Utility*
16	PU3b-C-RL-100-1	0.773
10	PU3b-RL-100-1	0.762
13	PU3b-C-F-100-1	0.750
7	PU3b-F-100-1	0.742
17	PU3b-C-RL-400-1	0.713
5	PU3b-NS-1000	0.712
4	PU3b-NS-400	0.710
3	PU3b-NS-100	0.696
11	PU3b-RL-400-1	0.696
14	PU3b-C-F-400-1	0.664
8	PU3b-F-400-1	0.653
12	PU3b-C-G-100-1	0.642
6	PU3b-G-100-1	0.637
2	PU3b-R1	0.619
15	PU3b-C-F-1000-1	0.559
9	PU3b-F-1000-1	0.549
1	PU3b-0	0.508

	Scenario 3	
Plan	*Plan Code*	*Utility*
16	PU3b-C-RL-100-1	0.792
10	PU3b-RL-100-1	0.781
13	PU3b-C-F-100-1	0.763
7	PU3b-F-100-1	0.755
17	PU3b-C-RL-400-1	0.730
4	PU3b-NS-400	0.722
5	PU3b-NS-1000	0.720
11	PU3b-RL-400-1	0.719
3	PU3b-NS-100	0.716
14	PU3b-C-F-400-1	0.677
8	PU3b-F-400-1	0.668
12	PU3b-C-G-100-1	0.652
2	PU3b-R1	0.649
6	PU3b-G-100-1	0.647
15	PU3b-C-F-1000-1	0.573
9	PU3b-F-1000-1	0.563
1	PU3b-0	0.543

	Scenario 4	
Plan	*Plan Code*	*Utility*
16	PU3b-C-RL-100-1	0.780
10	PU3b-RL-100-1	0.770
13	PU3b-C-F-100-1	0.755
7	PU3b-F-100-1	0.747
17	PU3b-C-RL-400-1	0.717
4	PU3b-NS-400	0.716
5	PU3b-NS-1000	0.715
11	PU3b-RL-400-1	0.704
3	PU3b-NS-100	0.703
14	PU3b-C-F-400-1	0.668
8	PU3b-F-400-1	0.659
12	PU3b-C-G-100-1	0.646
6	PU3b-G-100-1	0.640
2	PU3b-R1	0.627
15	PU3b-C-F-1000-1	0.564
9	PU3b-F-1000-1	0.554
1	PU3b-0	0.515

Figure 38. Contributions of Each Metric to the Multi-attribute Utility Score for Preference Pattern A by Scenario for PU-3b.

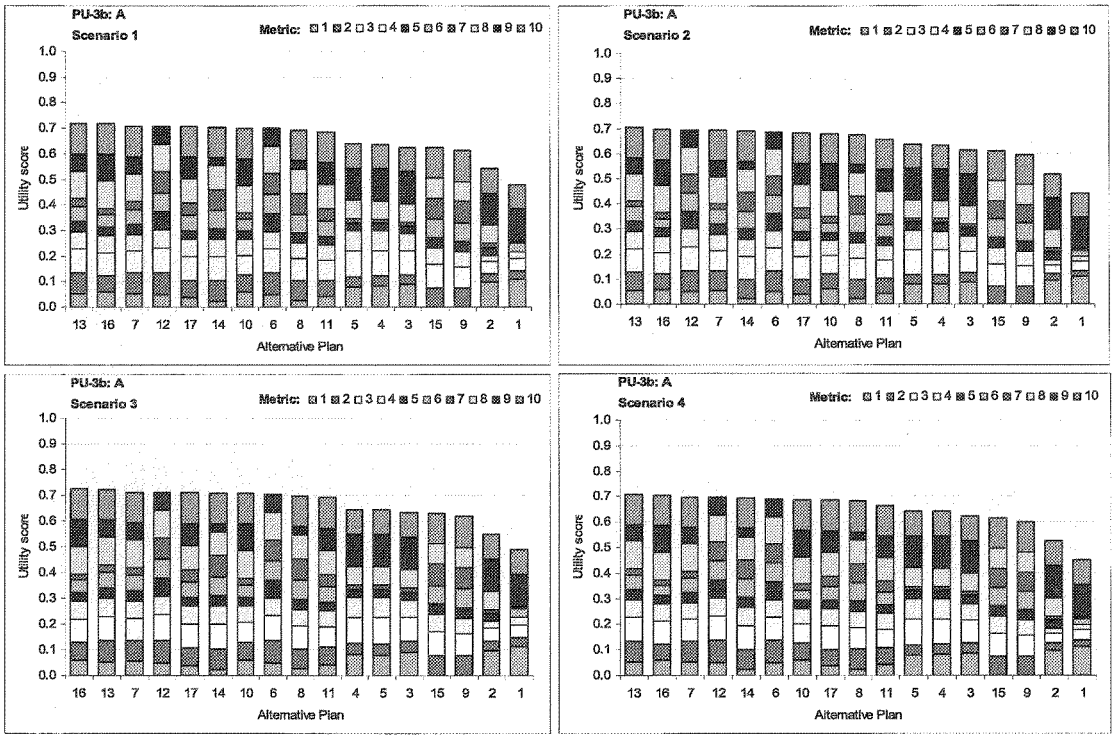


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Figure 39. Contributions of Each Metric to the Multi-attribute Utility Score for Preference Pattern B by Scenario for PU-3b.

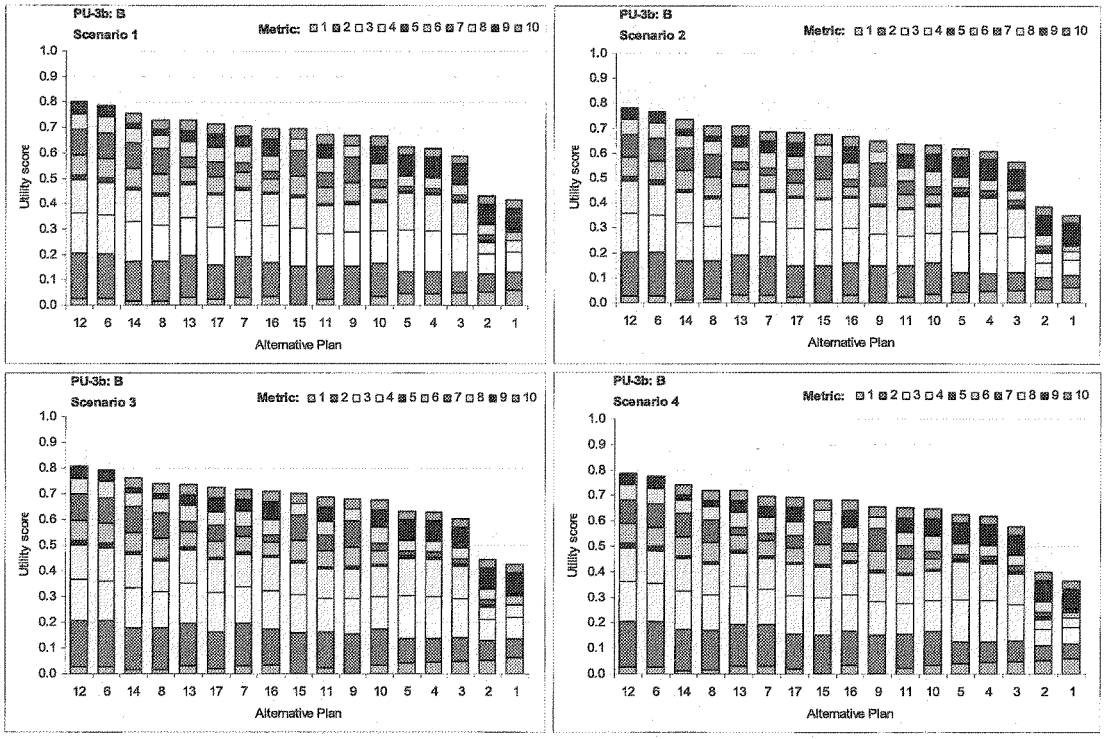
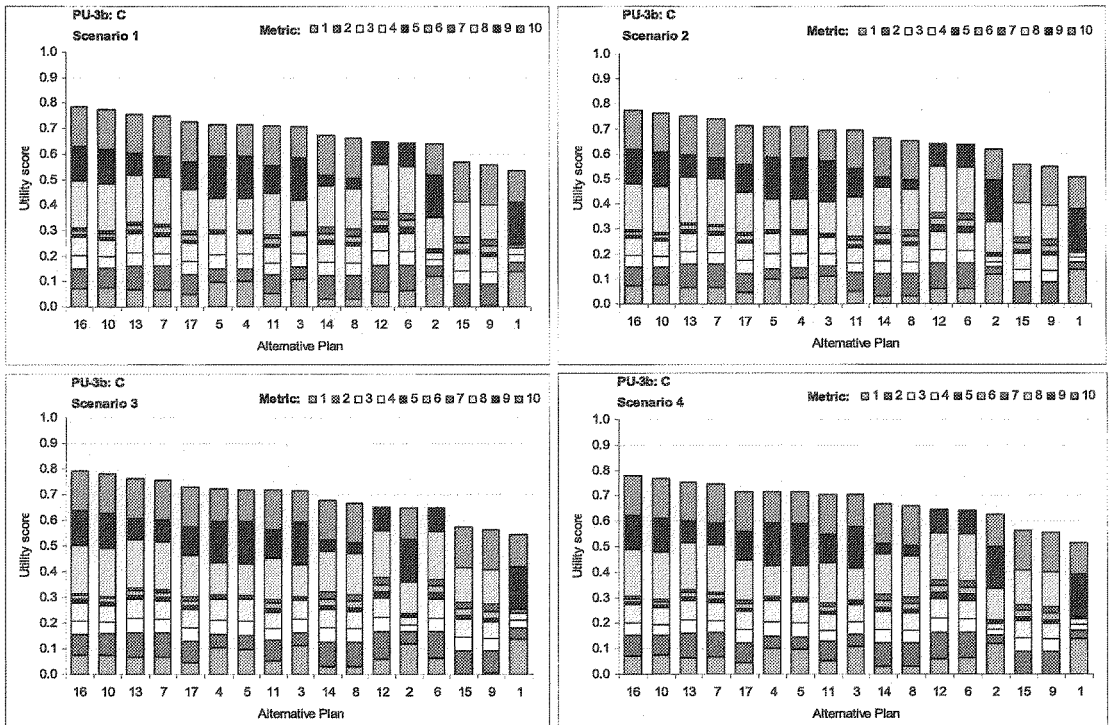


Figure 40. Contributions of Each Metric to the Multi-attribute Utility Score for Preference Pattern C by Scenario for PU-3b.



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6.5.1 Sensitivity of Preferred Alternatives – Planning Unit 3b

Table 36 shows the preferred alternatives over four possible relative sea level rise and re-development scenarios. Each cell indicates the preferred alternative given the scenario and the coastal alternative. This table shows that, for PU-3b:A, the preference for plan PU3b-C-F-100-1 (Plan 13) is sensitive to the assumptions made about relative sea level rise and pattern of development. For PU-3b:A, the preferred alternative, plan PU3b-C-F-100-1 (Plan 13), is preferred under both higher and lower rates of relative sea level rise (Scenarios 2 and 4) under the high/dispersed pattern of development. Plan PU3b-C-RL-100-1 (Plan 5) is preferred under lower rate of relative sea level rise and the business as usual/compact pattern of development. For PU-3b:B, plan PU3b-C-G-100-1 (Plan 12) is preferred regardless of the rate of relative sea level rise and pattern of development. This table shows that this pattern also holds for PU-3b:C, where plan PU3b-C-RL-100-1 (Plan 16) is preferred.

Table 36. Preferred Plan Matrix for Three Preference Patterns in PU3b.

PU-3b: A	Relative Sea-level Rise	
Pattern of Development	Lower	Higher
High/Dispersed	PU3b-C-F-100-1	PU3b-C-F-100-1
BAU/Compact	PU3b-C-RL-100-1	PU3b-C-F-100-1

PU-3b: B	Relative Sea-level Rise	
Pattern of Development	Lower	Higher
High/Dispersed	PU3b-C-G-100-1	PU3b-C-G-100-1
BAU/Compact	PU3b-C-G-100-1	PU3b-C-G-100-1

PU-3b: C	Relative Sea-level Rise	
Pattern of Development	Lower	Higher
High/Dispersed	PU3b-C-RL-100-1	PU3b-C-RL-100-1
BAU/Compact	PU3b-C-RL-100-1	PU3b-C-RL-100-1

6.5.2 Expected Utility – Planning Unit 3b

Figures 41 through 43 plot the expected utility of each alternative assuming a uniform distribution of probability across the two relative sea level rise scenarios (P(RSLR = Lower) = 0.5 and P(RSLR = Higher) = 0.5) for each preference pattern. These four figures illustrate the expected utility of each alternative assuming a High Employment and Dispersed Population scenario. (BAU/Compact was not generated.) These figures illustrate how the utility of some alternatives may be more or less sensitive to relative sea level rise assumptions than the utility of other alternatives. The error bands on expected utility represent the minimum and maximum levels of utility over the four scenarios considered in the LACPR plan. Alternatives with more sensitivity to relative sea level rise and development assumptions will have wider error bands than those with less sensitivity. Alternatives that have narrower error bands can be judged to be more predictable in terms of the level of utility they will provide. For example, Plans 4 and 5 have narrow error bands for PU-3b:A (Figure 41). The expected utility of any given alternative and its range of possible values depends in part upon what set of weights is chosen to calculate utility.

The calculation of expected utility requires the assignment of probability to each scenario, but in this case our interest is not in any particular set of probabilities. Rather, our interest is in understanding how the different alternatives perform under different allocations of probability to the scenarios. For example, a change in the probabilities might cause expected utility for some alternatives to increase while causing expected utility for other alternatives to decrease. We are also interested in the range of expected utility for each scenario. The expected utilities shown in these figures assume high employment/dispersed populations. Alternatives that have expected utilities with smaller ranges represent more predictable outcomes. These alternatives (for example, Plan 13 in Figure 41) may be preferred to others that have larger ranges (for example, Plan 16 in Figure 41) because these alternatives lead to more predictable outcomes.

Figure 41. Expected Utility of each PU-3b Alternative for Preference Pattern A, showing minimum and maximum utility scores (Scenarios 1 & 2: High Employment/ Dispersed Population).

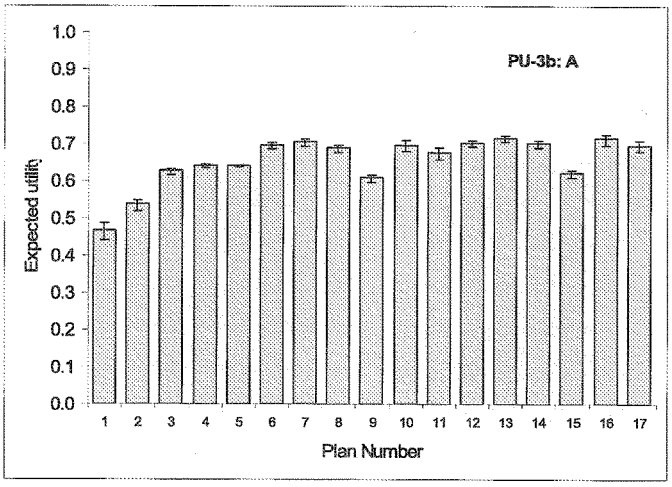


Figure 42. Expected Utility of each PU-3b Alternative for Preference Pattern B, showing minimum and maximum utility scores. (Scenarios 1 & 2: High Employment/ Dispersed Population).

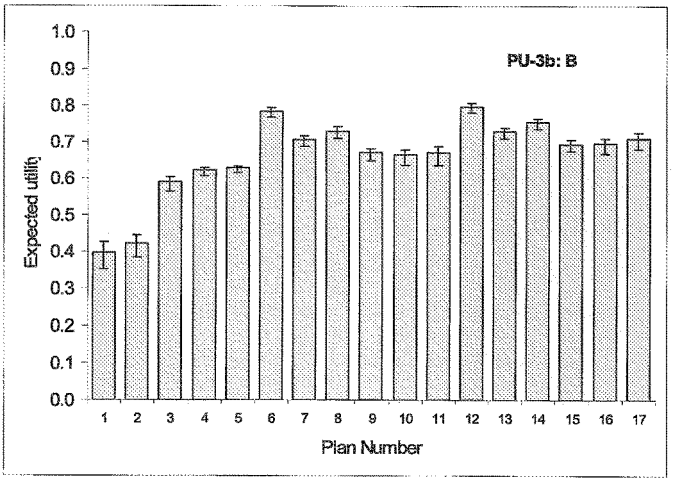
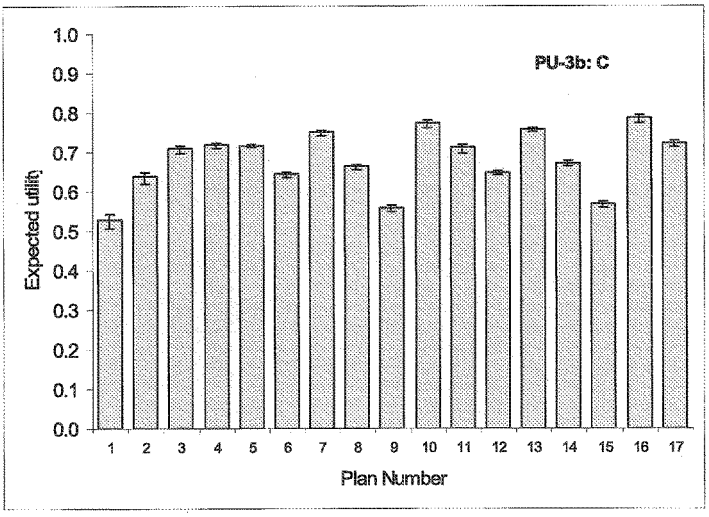


Figure 43. Expected Utility of each PU-3b Alternative for Preference Pattern C, showing minimum and maximum utility scores. (Scenarios 1 & 2: High Employment/ Dispersed Population).



6.5.3 Sensitivity of Decisions to Assumptions about the Probability of Higher Levels of Relative Sea Level Rise – Planning Unit 3b

Table 37 shows the sensitivity of the preferred alternative to assumptions about the allocation of probabilities to relative sea level rise scenarios for each of the three preference patterns and for each development scenario.

For PU-3b:A, under Scenarios 3 and 4, the preferred alternative changes between P(RSLR = Higher) = 0.1 and P(RSLR = Higher) = 0.2. A decision maker who has preferences that are consistent with those of PU-3b:A and who believes that the P(RSLR = Higher) < 0.2 would prefer Plan 16 under Scenarios 3 and 4. This illustrates an important point. Although a decision maker may not have precise knowledge about the probabilities associated with the scenarios, it is still possible to inform a decision by thinking in less precise terms. For PU-3b:B, the decision is insensitive for all scenarios, with Plan 12 being preferred. For stakeholders with preferences that are consistent with those of PU-3b:B, the plan that maximizes expected utility is also Plan 12.

For stakeholders with preferences that are consistent with those of PU-3b:C, the plan that maximizes expected utility is Plan 16.

Table 37. Preferred Plan Matrix for PU3b.

PU-3b: A	Probability (RSLR = Higher)										
Development Scenario	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
High Employment/ Dispersed Population (Scenarios 1&2)	13	13	13	13	13	13	13	13	13	13	13
BAU Employment/Compact Population (Scenarios 3&4)	16	16	13	13	13	13	13	13	13	13	13

PU-3b: B	Probability (RSLR = Higher)										
Development Scenario	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
High Employment/ Dispersed Population (Scenarios 1&2)	12	12	12	12	12	12	12	12	12	12	12
BAU Employment/Compact Population (Scenarios 3&4)	12	12	12	12	12	12	12	12	12	12	12

PU-3b: C	Probability (RSLR = Higher)										
Development Scenario	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
High Employment/ Dispersed Population (Scenarios 1&2)	16	16	16	16	16	16	16	16	16	16	16
BAU Employment/Compact Population (Scenarios 3&4)	16	16	16	16	16	16	16	16	16	16	16

6.6 Results for Illustrative Preference Patterns – Planning Unit 4

MAU scores were calculated for each of the coastal, structural, and nonstructural plans and the no-action alternative for three illustrative preference patterns selected for this discussion (Table 38). Figure 44 shows the proportion of total weight placed on each of the metrics. Preference pattern PU-4:A put the highest weight on reducing direct economic damages (DAM) and residual risks to the resident population (POP). PU-4:A also places importance on minimizing the length of time to construct a protection system (TIME) and reducing life-cycle costs (COST). PU-4:B puts the highest weight on minimizing direct wetland impacts (DWI), but also places a high importance on reducing the length of time to construct a protection system (TIME) and minimizing life-cycle project costs (COST). PU-4:B places no importance on maximizing the number of historic districts, historic properties, and archeological sites protected. The preference pattern PU-4:C contrasts with the other two in terms of the relative importance that is placed on minimizing population impacts (POP). PU-4:C places little importance on maximizing the number of historic districts, historic properties, and archeological sites protected, as well as direct wetland impacts (DWI) and indirect environmental impacts (IEI).

Table 38. Swing weights for three illustrative preference patterns discussed for PU4.

#	Code	Name	PU-1:A	PU-1:B	PU-1:C
1	COST	Life-cycle Cost ($ Billions)	0.1286	0.1724	0.0325
2	POP	Population Impacted (People/Year)	0.1429	0.1149	0.6494
3	DAM	Direct Economic Damages ($ Millions/Year)	0.1429	0.069	0.0649
4	EMP	Employment Impacts (Jobs Disrupted/Year)	0.1000	0.1149	0.1623
5	ASIT	Archeological Sites Protected (Number of Sites)	0.1000	0.0000	0.0065
6	HDIS	Historic Districts Protected (Number of Districts)	0.1000	0.0000	0.0065
7	HPRO	Historic Properties Protected (Number of Properties)	0.0000	0.0000	0.0000
8	TIME	Construction Time (Years)	0.1286	0.1839	0.0649
9	DWI	Direct Wetland Impacts (Acres)	0.1000	0.2299	0.0065
10	IEI	Indirect Environmental Impacts (Scale; -8 to +8)	0.0571	0.1149	0.0065
		Top-ranked metric	DAM	DWI	POP

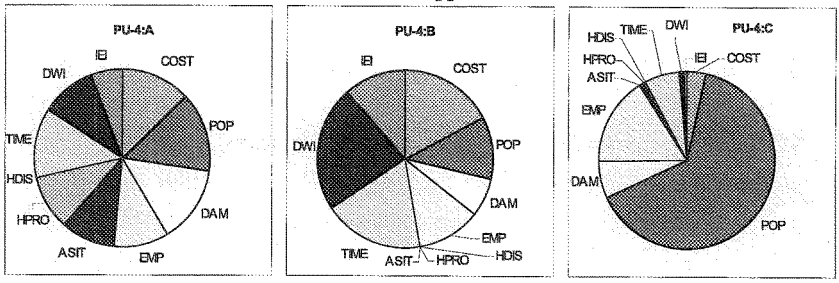
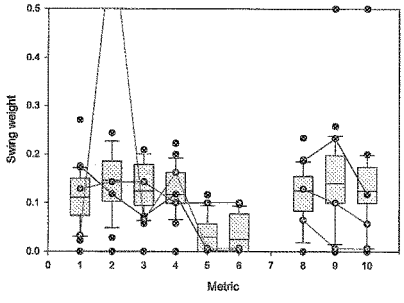


Figure 44. Three illustrative preference patterns discussed for PU4.

The illustrative preference patterns selected for discussion here are each unique within the planning unit, but they are not necessarily atypical. Usually, a preference pattern contains some weights that are similar to those of other stakeholders and some weights that represent extremes. Figure 45 shows how each of the swing weights in the illustrative preference pattern compares to the other swing weights in this planning unit. In this figure, the three color-coded sets of weights are overlaid on the box plots that were introduced in Section 3. The closer each of the color-coded points is to being within the gray box for a particular performance measure, the more typical the weight. Points that fall outside the error bars that surround the gray box indicate extreme positions relative to other survey respondents, or outliers.



#	Code	Metric Name
1	COST	Life-cycle Cost ($ Billions)
2	POP	Population Impacted (People/Year)
3	DAM	Direct Economic Damages ($ Millions/Year)
4	EMP	Employment Impacts (Jobs Disrupted/Year)
5	ASIT	Archeological Sites Protected (Number of Sites)
6	HDIS	Historic Districts Protected (Number of Districts)
7	HPRO	Historic Properties Protected (Number of Properties)
8	TIME	Construction Time (Years)
9	DWI	Direct Wetland Impacts (Acres)
10	IEI	Indirect Environmental Impacts (Scale; -8 to +8)

Figure 45. Swing weights for the three preference patterns evaluated for PU4 superimposed on the weight elicitation results summarized in Figure 1. The swing weights of three individual stakeholders represent illustrative preference patterns designated as PU-4:A (red), PU-4:B (blue), and PU-4:C (green).

These three illustrative preference patterns produce a unique rank order of plans. These rank orders are illustrated in Figure 46 for each of the preference patterns. The underlying table was introduced in Section 5 and shows the number of times that each plan ranked first, second, third, fourth, or fifth when plans were ranked in decreasing order by the utility score. The top five plans for PU-4:A are shown in red. The non-structural plans (PU4-NS-100, PU4-NS-400, and PU4-NS-1000) are the top three plans and comprehensive ring levee (C-RL) alignments rank fourth and fifth. The top five plans for PU-4:B are shown in blue. The 100-year comprehensive ring levee (C-RL) alignment is the top-ranked plan, followed by the 400-year comprehensive ring levee alignment. The three non-structural plans are also among the top five ranked plans. The top five plans for PU4-C are shown in green. The top-five plans include four comprehensive GIWW (C-G) alignments and the 1000-year non-structural alternatives. These results are presented here to illustrate that different sets of weights lead to different rankings of plans. While the rankings suggest order of preference, they do not indicate how much more or less preferred a plan is relative to other plans. In addition, these figures do not help explain why a particular set of weights leads to a particular ranking of plans. These issues are discussed in greater detail below.

PU4, Scenario 1						
PLAN CODE	Rank Based on Swing Weights					Total
	1	2	3	4	5	
PU4-0	0	0	1	0	0	1
PU4-C-G-100-1	0	1	0	0	0	1
PU4-C-G-100-2	0	0	0	1	0	1
PU4-C-G-1000-3	1	0	0	0	0	1
PU4-C-G-400-3	0	0	1	0	0	1
PU4-C-RL-100-1	3	3	0	1	5	12
PU4-C-RL-1000-1	0	1	0	2	14	17
PU4-C-RL-400-1	6	3	6	10	0	25
PU4-NS-100	0	1	9	7	5	22
PU4-NS-1000	15	3	7	1	1	27
PU4-NS-400	1	14	6	4	1	26
PU4-R1	0	0	1	0	0	1
Total	26	26	31	26	26	135

Figure 46. Rank order of the top five plans for the illustrative preference patterns. The preference patters are color coded as follows: PU-4:A is red, PU-4:B is blue, and PU-4:C is green.

In the discussion of PU-4 results that follows, plans are numbered 1-19 to facilitate references in tables and figures (Table 39). Plans are ranked by MAU for each planning scenario and characteristic sets of preferences in Tables 42-44.

Table 39. Plan Numbers and Plan Names for PU4.

Plan	*Plan Code*
1	PU4-0
2	PU4-R1
3	PU4-NS-100
4	PU4-NS-400
5	PU4-NS-1000
6	PU4-G-100-1
7	PU4-G-100-2
8	PU4-G-400-3
9	PU4-G-1000-3
10	PU4-RL-100-1
11	PU4-RL-400-1
12	PU4-RL-1000-1
13	PU4-C-G-100-1
14	PU4-C-G-100-2
15	PU4-C-G-400-3
16	PU4-C-G-1000-3
17	PU4-C-RL-100-1
18	PU4-C-RL-400-1
19	PU4-C-RL-1000-1

The 19 plans are ranked by MAU for each scenario and each of the three preference patterns in Tables 40 through 42. For example, Table 40 shows the utility of Plan 13 for PU-4:A under the planning assumptions used in Scenarios 1 and 3 is 0.699 and 0.702, respectively. Under the assumptions of Scenario 2 and 4, Plan 13 remains the top-ranked plan, but the utility score decreases to 0.682 and 0.683, respectively. The lower-levels of performance for this plan in Scenarios 2 and 4 can be attributed to the higher rates of sea-level rise assumed in these scenarios. For preference pattern PU-4:B, the effect of higher rates of sea-level rise is to make a different 100-year comprehensive plan (PU4-C-RL-100-1; Plan 17) more attractive. This shows sensitivity of the preferred plan to uncertainty in sea-level rise assumptions. For PU-4:C, Plan 16, another comprehensive plan, dominates the rankings under all four scenarios.

Figures 47 through 49 illustrate why different preference patterns might lead to different plan rankings by showing the contribution of each metric to utility for each plan, scenario, and preference pattern. For example, Figure 47 illustrates the contribution of each metric to utility for PU-4:A. Under a set of planning assumptions consistent with Scenario 1 (Lower RSLR and High Employment/Dispersed Population), the utility of Plan 13 for PU-4:A is 0.699. This can be attributed to the relative performance of this plan on those performance objectives that are important for this preference pattern. Although a plan may contribute substantially towards one of the performance objectives, if the weights reflect relatively little importance on that objective, the performance with respect to that objective will make little contribution towards the overall utility for this preference pattern.

For PU-4:A, the top-ranked plan is one that is comprehensive, including both structural and non-structural measures: Plan 13 (Table 40 and Figure 47). For this preference pattern, the rank order of the top four plans is not dependent upon scenario assumptions. The second and third-ranked plans for all scenarios were Plan 5 (non-structural) and Plan 4 (non-structural). The metrics most contributing to the MAU scores and influencing utility for PU-4:A were indirect environmental impacts (No. 10), construction time (No. 8), and historic properties and archeological sites protected (Nos. 5 and 6).

The top ranked plan for PU-4:B is one that is comprehensive (Plan 17), including both structural and non-structural measures (Table 41 and Figure 48). The rank order for PU-4:B plans was sensitive to scenario assumptions. The second-ranked plan for Scenarios 1, 2, and 3 was Plan 18 (comprehensive); the second-ranked plan for Scenario 4 was Plan 4 (non-structural). The metrics most contributing to MAU and influencing utility for PU-4:B were direct wetland impacts (No. 9) and construction time (No. 8).

For PU-4:C, the three top-ranked plans are comprehensive plans, which include both structural and non-structural measures: Plans 16, 13 and 15 (Table 42 and Figure 49). For this preference pattern, the rank order of the top three plans is not dependent upon scenario assumptions. Metrics most contributing to the MAU scores and influencing utility for PU-4:C were employment impacts (No. 4) and population impacts (No. 2).

Table 40. Plans Ranked by Multi-attribute Utility Score for PU-4, Preference Pattern A.

PU-4: A

	Scenario 1	
Plan	*Plan Code*	*Utility*
13	PU4-C-G-100-1	0.699
5	PU4-NS-1000	0.690
4	PU4-NS-400	0.687
3	PU4-NS-100	0.673
18	PU4-C-RL-400-1	0.668
16	PU4-C-G-1000-3	0.636
15	PU4-C-G-400-3	0.632
19	PU4-C-RL-1000-1	0.630
14	PU4-C-G-100-2	0.628
17	PU4-C-RL-100-1	0.627
6	PU4-G-100-1	0.604
2	PU4-R1	0.555
7	PU4-G-100-2	0.531
11	PU4-RL-400-1	0.515
10	PU4-RL-100-1	0.514
8	PU4-G-400-3	0.508
9	PU4-G-1000-3	0.508
12	PU4-RL-1000-1	0.499
1	PU4-0	0.408

	Scenario 2	
Plan	*Plan Code*	*Utility*
13	PU4-C-G-100-1	0.682
5	PU4-NS-1000	0.663
4	PU4-NS-400	0.659
3	PU4-NS-100	0.638
16	PU4-C-G-1000-3	0.623
19	PU4-C-RL-1000-1	0.613
18	PU4-C-RL-400-1	0.611
14	PU4-C-G-100-2	0.610
17	PU4-C-RL-100-1	0.603
15	PU4-C-G-400-3	0.601
6	PU4-G-100-1	0.586
7	PU4-G-100-2	0.512
2	PU4-R1	0.499
10	PU4-RL-100-1	0.489
9	PU4-G-1000-3	0.489
12	PU4-RL-1000-1	0.474
11	PU4-RL-400-1	0.473
8	PU4-G-400-3	0.472
1	PU4-0	0.371

	Scenario 3	
Plan	*Plan Code*	*Utility*
13	PU4-C-G-100-1	0.702
5	PU4-NS-1000	0.699
4	PU4-NS-400	0.697
3	PU4-NS-100	0.682
18	PU4-C-RL-400-1	0.669
16	PU4-C-G-1000-3	0.640
19	PU4-C-RL-1000-1	0.636
14	PU4-C-G-100-2	0.634
15	PU4-C-G-400-3	0.633
17	PU4-C-RL-100-1	0.633
6	PU4-G-100-1	0.597
2	PU4-R1	0.553
7	PU4-G-100-2	0.527
11	PU4-RL-400-1	0.517
10	PU4-RL-100-1	0.515
8	PU4-G-400-3	0.504
9	PU4-G-1000-3	0.504
12	PU4-RL-1000-1	0.500
1	PU4-0	0.407

	Scenario 4	
Plan	*Plan Code*	*Utility*
13	PU4-C-G-100-1	0.683
5	PU4-NS-1000	0.673
4	PU4-NS-400	0.670
3	PU4-NS-100	0.647
16	PU4-C-G-1000-3	0.626
19	PU4-C-RL-1000-1	0.618
14	PU4-C-G-100-2	0.615
18	PU4-C-RL-400-1	0.613
17	PU4-C-RL-100-1	0.610
15	PU4-C-G-400-3	0.601
6	PU4-G-100-1	0.574
7	PU4-G-100-2	0.504
2	PU4-R1	0.495
10	PU4-RL-100-1	0.488
9	PU4-G-1000-3	0.481
12	PU4-RL-1000-1	0.476
11	PU4-RL-400-1	0.473
8	PU4-G-400-3	0.465
1	PU4-0	0.367

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Table 41. Plans Ranked by Multi-attribute Utility Score for PU-4, Preference Pattern B.

PU-4: B

	Scenario 1	
Plan	*Plan Code*	*Utility*
17	PU4-C-RL-100-1	0.694
18	PU4-C-RL-400-1	0.685
4	PU4-NS-400	0.674
5	PU4-NS-1000	0.673
3	PU4-NS-100	0.666
19	PU4-C-RL-1000-1	0.657
10	PU4-RL-100-1	0.607
14	PU4-C-G-100-2	0.591
11	PU4-RL-400-1	0.582
2	PU4-R1	0.575
13	PU4-C-G-100-1	0.571
15	PU4-C-G-400-3	0.568
16	PU4-C-G-1000-3	0.564
12	PU4-RL-1000-1	0.557
1	PU4-0	0.521
7	PU4-G-100-2	0.516
6	PU4-G-100-1	0.499
8	PU4-G-400-3	0.468
9	PU4-G-1000-3	0.467

	Scenario 2	
Plan	*Plan Code*	*Utility*
17	PU4-C-RL-100-1	0.675
18	PU4-C-RL-400-1	0.671
4	PU4-NS-400	0.664
5	PU4-NS-1000	0.664
3	PU4-NS-100	0.650
19	PU4-C-RL-1000-1	0.642
10	PU4-RL-100-1	0.586
14	PU4-C-G-100-2	0.575
11	PU4-RL-400-1	0.561
13	PU4-C-G-100-1	0.556
15	PU4-C-G-400-3	0.555
16	PU4-C-G-1000-3	0.552
2	PU4-R1	0.543
12	PU4-RL-1000-1	0.536
7	PU4-G-100-2	0.499
1	PU4-0	0.491
6	PU4-G-100-1	0.483
8	PU4-G-400-3	0.451
9	PU4-G-1000-3	0.450

	Scenario 3	
Plan	*Plan Code*	*Utility*
17	PU4-C-RL-100-1	0.699
18	PU4-C-RL-400-1	0.684
4	PU4-NS-400	0.683
5	PU4-NS-1000	0.680
3	PU4-NS-100	0.673
19	PU4-C-RL-1000-1	0.661
10	PU4-RL-100-1	0.609
14	PU4-C-G-100-2	0.597
11	PU4-RL-400-1	0.584
13	PU4-C-G-100-1	0.575
2	PU4-R1	0.574
15	PU4-C-G-400-3	0.567
16	PU4-C-G-1000-3	0.567
12	PU4-RL-1000-1	0.559
1	PU4-0	0.520
7	PU4-G-100-2	0.515
6	PU4-G-100-1	0.495
8	PU4-G-400-3	0.467
9	PU4-G-1000-3	0.466

	Scenario 4	
Plan	*Plan Code*	*Utility*
17	PU4-C-RL-100-1	0.681
4	PU4-NS-400	0.674
5	PU4-NS-1000	0.672
18	PU4-C-RL-400-1	0.670
3	PU4-NS-100	0.658
19	PU4-C-RL-1000-1	0.646
10	PU4-RL-100-1	0.587
14	PU4-C-G-100-2	0.581
11	PU4-RL-400-1	0.562
13	PU4-C-G-100-1	0.559
16	PU4-C-G-1000-3	0.555
15	PU4-C-G-400-3	0.554
2	PU4-R1	0.542
12	PU4-RL-1000-1	0.540
7	PU4-G-100-2	0.497
1	PU4-0	0.490
6	PU4-G-100-1	0.476
8	PU4-G-400-3	0.448
9	PU4-G-1000-3	0.447

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Table 42. Plans Ranked by Multi-attribute Utility Score for PU-4, Preference Pattern C.

PU-4: C

	Scenario 1	
Plan	*Plan Code*	*Utility*
16	PU4-C-G-1000-3	0.800
13	PU4-C-G-100-1	0.782
15	PU4-C-G-400-3	0.768
14	PU4-C-G-100-2	0.736
5	PU4-NS-1000	0.714
19	PU4-C-RL-1000-1	0.693
4	PU4-NS-400	0.689
18	PU4-C-RL-400-1	0.673
3	PU4-NS-100	0.658
17	PU4-C-RL-100-1	0.631
6	PU4-G-100-1	0.616
7	PU4-G-100-2	0.568
9	PU4-G-1000-3	0.549
8	PU4-G-400-3	0.544
11	PU4-RL-400-1	0.449
12	PU4-RL-1000-1	0.447
2	PU4-R1	0.441
10	PU4-RL-100-1	0.440
1	PU4-0	0.403

	Scenario 2	
Plan	*Plan Code*	*Utility*
16	PU4-C-G-1000-3	0.773
13	PU4-C-G-100-1	0.750
15	PU4-C-G-400-3	0.737
14	PU4-C-G-100-2	0.704
5	PU4-NS-1000	0.677
4	PU4-NS-400	0.651
19	PU4-C-RL-1000-1	0.647
18	PU4-C-RL-400-1	0.624
3	PU4-NS-100	0.612
6	PU4-G-100-1	0.582
17	PU4-C-RL-100-1	0.577
7	PU4-G-100-2	0.533
9	PU4-G-1000-3	0.514
8	PU4-G-400-3	0.508
11	PU4-RL-400-1	0.393
12	PU4-RL-1000-1	0.392
10	PU4-RL-100-1	0.385
2	PU4-R1	0.349
1	PU4-0	0.313

	Scenario 3	
Plan	*Plan Code*	*Utility*
16	PU4-C-G-1000-3	0.833
13	PU4-C-G-100-1	0.809
15	PU4-C-G-400-3	0.799
14	PU4-C-G-100-2	0.772
5	PU4-NS-1000	0.757
19	PU4-C-RL-1000-1	0.736
4	PU4-NS-400	0.732
18	PU4-C-RL-400-1	0.714
3	PU4-NS-100	0.701
17	PU4-C-RL-100-1	0.675
6	PU4-G-100-1	0.631
7	PU4-G-100-2	0.591
9	PU4-G-1000-3	0.572
8	PU4-G-400-3	0.567
11	PU4-RL-400-1	0.486
12	PU4-RL-1000-1	0.483
10	PU4-RL-100-1	0.477
2	PU4-R1	0.468
1	PU4-0	0.430

	Scenario 4	
Plan	*Plan Code*	*Utility*
16	PU4-C-G-1000-3	0.805
13	PU4-C-G-100-1	0.777
15	PU4-C-G-400-3	0.769
14	PU4-C-G-100-2	0.739
5	PU4-NS-1000	0.725
4	PU4-NS-400	0.699
19	PU4-C-RL-1000-1	0.689
18	PU4-C-RL-400-1	0.670
3	PU4-NS-100	0.659
17	PU4-C-RL-100-1	0.629
6	PU4-G-100-1	0.595
7	PU4-G-100-2	0.555
9	PU4-G-1000-3	0.536
8	PU4-G-400-3	0.530
12	PU4-RL-1000-1	0.442
11	PU4-RL-400-1	0.432
10	PU4-RL-100-1	0.424
2	PU4-R1	0.382
1	PU4-0	0.347

Figure 47. Contributions of Each Metric to the Multi-attribute Utility Score for Preference Pattern A by Scenario for PU-4.

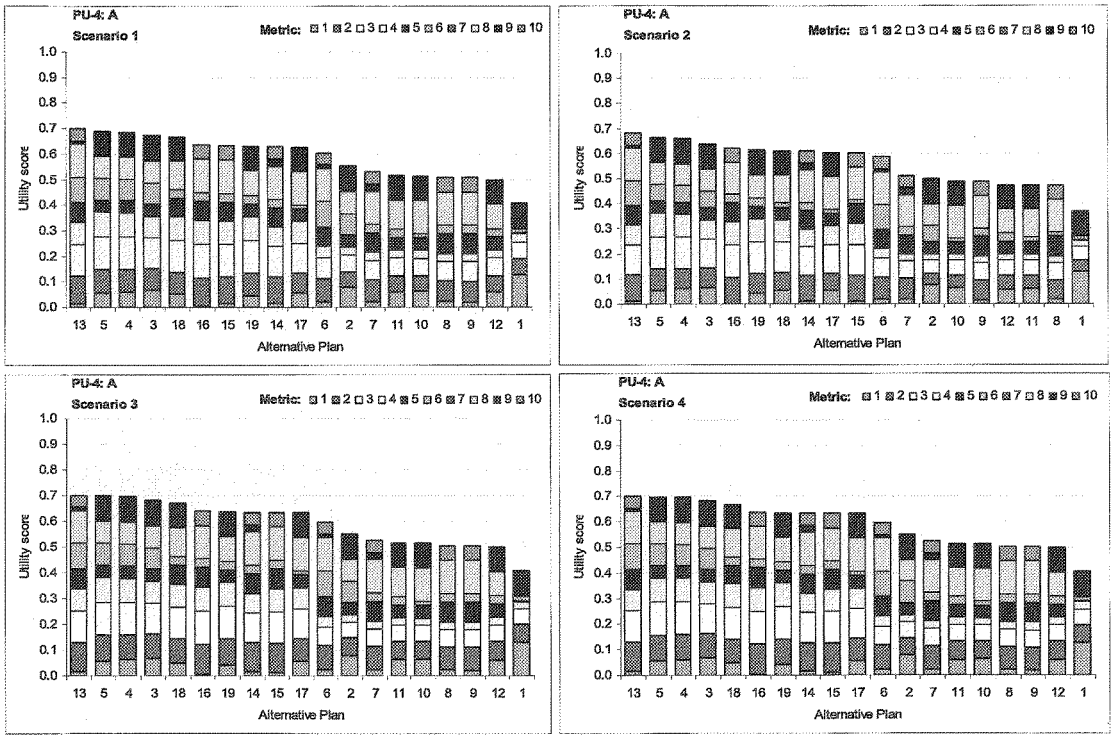


Figure 48. Contributions of Each Metric to the Multi-attribute Utility Score for Preference Pattern B by Scenario for PU-4.

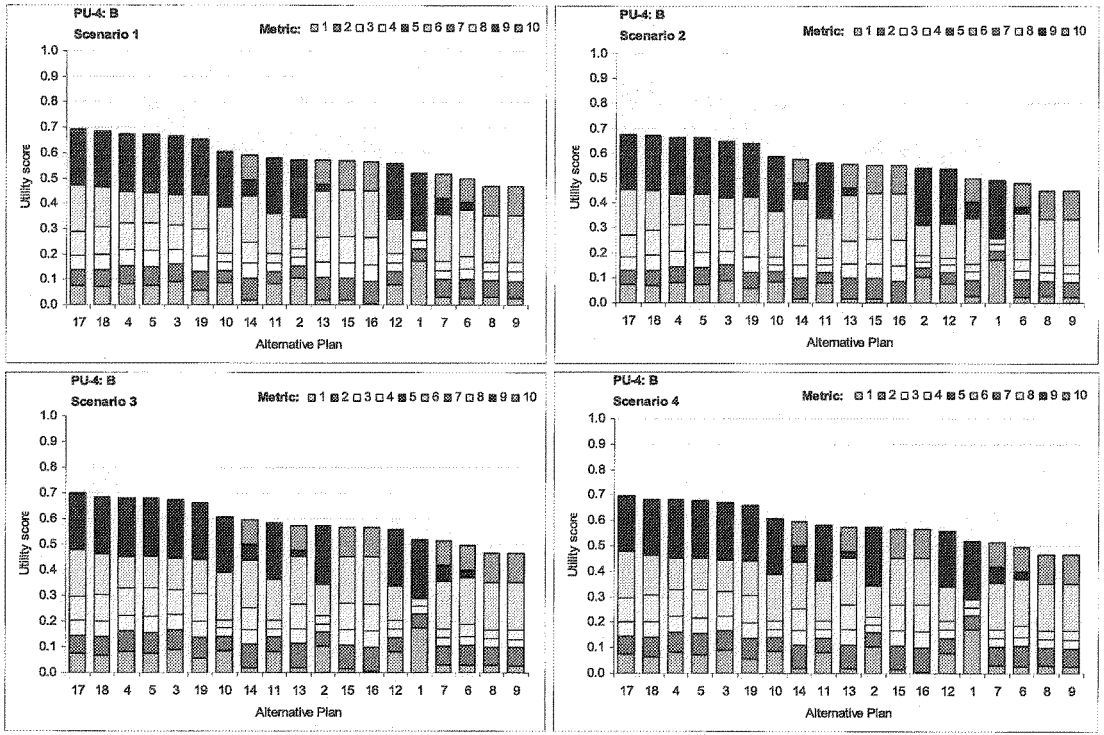
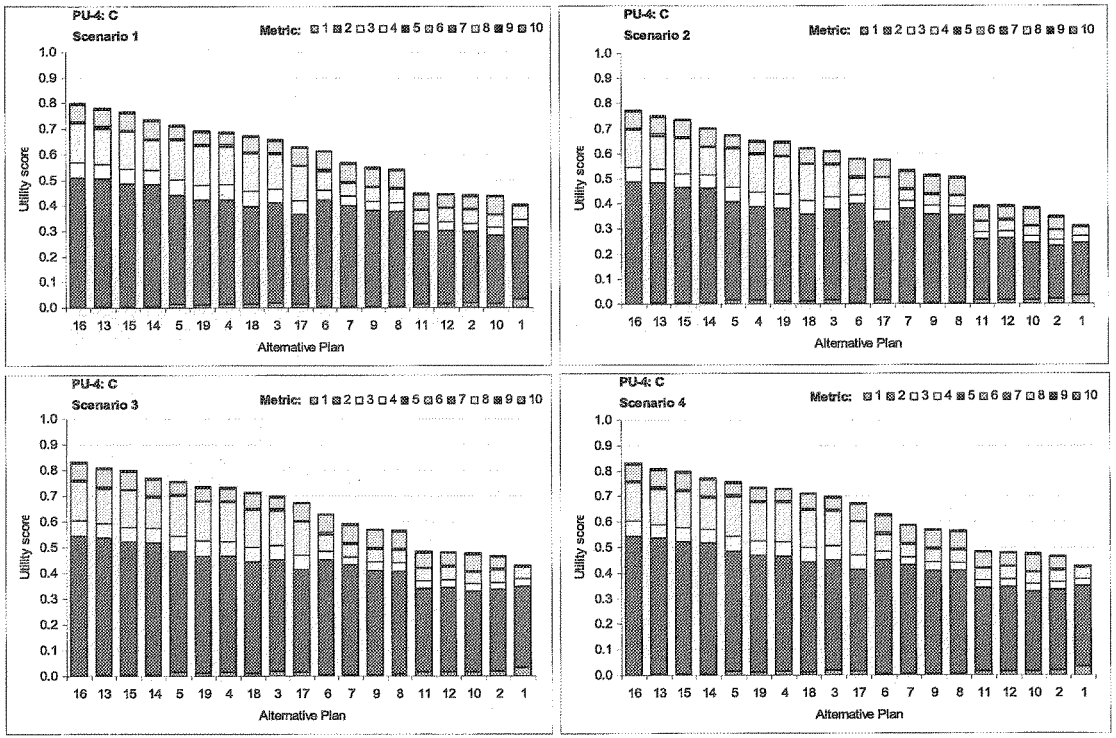


Figure 49. Contributions of Each Metric to the Multi-attribute Utility Score for Preference Pattern C by Scenario for PU-4.



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6.6.1 Sensitivity of Preferred Alternatives – Planning Unit 4

Table 43 shows the preferred alternatives over four possible relative sea level rise and re-development scenarios. Each cell indicates the preferred alternative given the scenario. For example, for PU-4:A, plan PU4-C-G-100-1 (Plan 13) is preferred regardless of rate of relative sea level rise and pattern of development. For PU-4:B and PU-4:C, plan PU4-C-RL-100-1 (Plan 17) and plan PU4-C-G-1000-3 (Plan 16) are preferred, respectively, regardless of rate of relative sea level rise and pattern of development.

Table 43. Preferred Plan Matrix for Three Preference Patterns in PU4.

PU-4: A	Relative Sea-level Rise	
Pattern of Development	Lower	Higher
High/Dispersed	PU4-C-G-100-1	PU4-C-G-100-1
BAU/Compact	PU4-C-G-100-1	PU4-C-G-100-1

PU-4: B	Relative Sea-level Rise	
Pattern of Development	Lower	Higher
High/Dispersed	PU4-C-RL-100-1	PU4-C-RL-100-1
BAU/Compact	PU4-C-RL-100-1	PU4-C-RL-100-1

PU-4: C	Relative Sea-level Rise	
Pattern of Development	Lower	Higher
High/Dispersed	PU4-C-G-1000-3	PU4-C-G-1000-3
BAU/Compact	PU4-C-G-1000-3	PU4-C-G-1000-3

6.6.2 Expected Utility – Planning Unit 4

Figures 50 through 52 plot the expected utility of each alternative assuming a uniform distribution of probability across the two relative sea level rise scenarios (P(RSLR = Lower) = 0.5 and P(RSLR = Higher) = 0.5) for each preference pattern. These three figures illustrate the expected utility of each alternative assuming a High Employment and Dispersed Population scenario. (BAU/Compact was not generated.) These figures illustrate how the utility of some alternatives may be more or less sensitive to relative sea level rise assumptions than the utility of other alternatives. The error bands on expected utility represent the minimum and maximum levels of

utility over the four scenarios considered in the LACPR plan. Alternatives with more sensitivity to relative sea level rise and development assumptions will have wider error bands than those with less sensitivity. Alternatives that have narrower error bands can be judged to be more predictable in terms of the level of utility they will provide. For example, Plan 13 has narrow error bands for PU-4:A (Figure 50). The expected utility of any given alternative and its range of possible values depends in part upon what set of weights is chosen to calculate utility.

The calculation of expected utility requires the assignment of probability to each scenario, but in this case our interest is not in any particular set of probabilities. Rather, our interest is in understanding how the different alternatives perform under different allocations of probability to the scenarios. For example, a change in the probabilities might cause expected utility for some alternatives to increase while causing expected utility for other alternatives to decrease. We are also interested in the range of expected utility for each scenario. The expected utilities shown in these figures assume high employment/dispersed populations. Alternatives that have expected utilities with smaller ranges represent more predictable outcomes. These alternatives (for example, Plan 18 in Figure 51) may be preferred to others that have larger ranges (for example, Plan 17 in Figure 51) because these alternatives lead to more predictable outcomes.

Figure 50. Expected Utility of each PU-4 Alternative for Preference Pattern A, showing minimum and maximum utility scores (Scenarios 1 & 2: High Employment/ Dispersed Population).

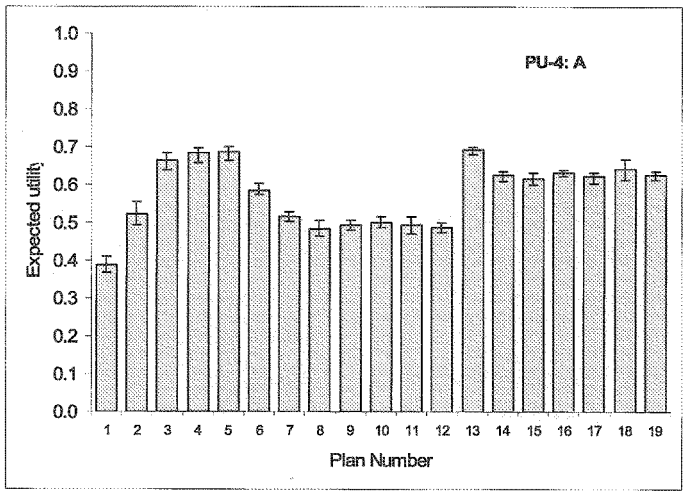


Figure 51. Expected Utility of each PU-4 Alternative for Preference Pattern B, showing minimum and maximum utility scores. (Scenarios 1 & 2: High Employment/ Dispersed Population).

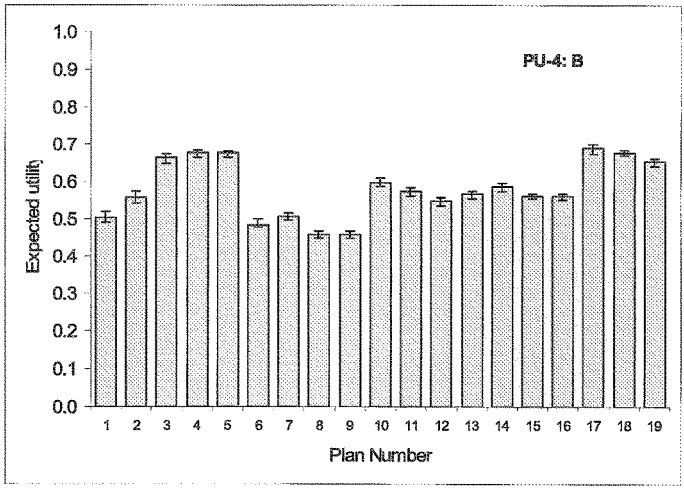
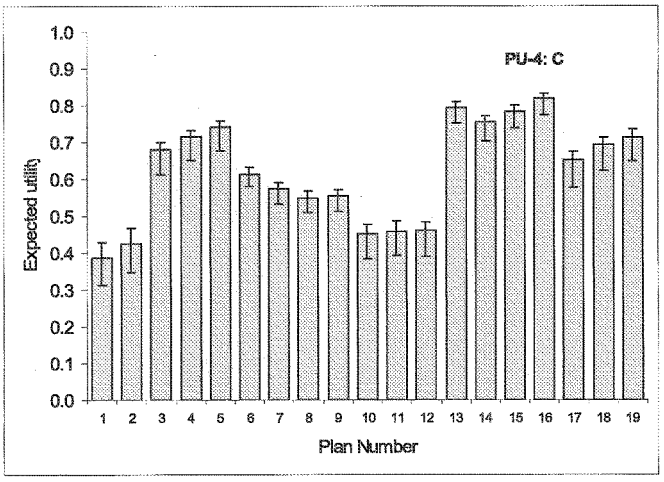


Figure 52. Expected Utility of each PU-4 Alternative for Preference Pattern C, showing minimum and maximum utility scores. (Scenarios 1 & 2: High Employment/ Dispersed Population).



6.6.3 Sensitivity of Decisions to Assumptions about the Probability of Higher Levels of Relative Sea Level Rise – Planning Unit 4

Table 44 shows the sensitivity of the preferred alternative to assumptions about the allocation of probabilities to relative sea level rise scenarios for each of the three preference patterns and for each development scenario. For PU-4:A, the decision is insensitive for all scenarios, with Plan 13 being preferred. Likewise, for PU-4:B and PU4-C, the decision is insensitive for all scenarios, with Plan 17 and Plan 16 being preferred, respectively.

Table 44. Preferred Plan Matrix for PU-4.

PU-4: A	Probability (RSLR = Higher)										
Development Scenario	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
High Employment/ Dispersed Population (Scenarios 1&2)	13	13	13	13	13	13	13	13	13	13	13
BAU Employment/Compact Population (Scenarios 3&4)	13	13	13	13	13	13	13	13	13	13	13

PU-4: B	Probability (RSLR = Higher)										
Development Scenario	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
High Employment/ Dispersed Population (Scenarios 1&2)	17	17	17	17	17	17	17	17	17	17	17
BAU Employment/Compact Population (Scenarios 3&4)	17	17	17	17	17	17	17	17	17	17	17

PU-4: C	Probability (RSLR = Higher)										
Development Scenario	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
High Employment/ Dispersed Population (Scenarios 1&2)	16	16	16	16	16	16	16	16	16	16	16
BAU Employment/Compact Population (Scenarios 3&4)	16	16	16	16	16	16	16	16	16	16	16

7. Discussion

This application of MCDA to the RIDF has focused on developing an objectives hierarchy for LACPR, identifying a set of metrics to model performance outcomes, and developing a multi-attribute utility function to rate the relative performance of alternatives. In the analysis of results, LACPR plan alternatives are ranked by MAU score using three different sets of attribute weights. Each set of weights characterizes an illustrative pattern of preference that exists within the stakeholder community. Plans are ranked by MAU score and, in the absence of uncertainty in the assumptions used to model plan outcomes, the preferred plan for each preference pattern is the plan with the highest MAU score. However, most decisions with long-range planning horizons involve a considerable amount of uncertainty and LACPR is no exception. Therefore, the LACPR team has expended considerable effort to evaluate the sensitivity of plans to uncertainty in the parameters or assumptions of models used to simulate performance outcomes.

Uncertain parameters and assumptions of interest to LACPR include the rates of relative sea level rise, the employment growth rate, and the population distribution. Decisions under uncertainty should maximize expected utility, which would require a set of probability distributions for the uncertain variables in order to calculate probabilities for each scenario. At this point in the planning process, a set of probability distributions has not been developed for the four scenarios. Therefore, this analysis assesses sensitivity over a limited scenario set to assess the robustness of decision alternatives. Robust decision alternatives are those that have consistently high MAU scores across the planning scenarios.

In addition to augmenting the USACE's 6-step P&G guidelines with uncertainty, MCDA also provides mechanisms to engage stakeholders more actively in the USACE's planning process. For example, MCDA helps decision makers and stakeholders: 1) systematically structure the decision process; 2) assess tradeoffs among decision objectives; 3) reflect upon, articulate, and apply explicit value judgments concerning conflicting decision criteria; 4) make more consistent and rational evaluations of risks and uncertainties; and 5) facilitate negotiation (Hobbs and Meier 2000). In addition to improving the quality of decisions, MCDA helps decision makers engage stakeholders. Stakeholders assist decision makers to develop an objectives hierarchy and to

assess the relative importance of those decision objectives. An obvious benefit of engaging stakeholders during the planning process is that this is likely to engender greater trust and confidence on the part of stakeholders and may enhance the sense of legitimacy of the decision or final outcome. The objectives hierarchy is described in Section 3.1.3 of the main RIDF Appendix and the stakeholder weight elicitation sessions are described in Section 2 of this attachment.

The results of this analysis can be used to draw conclusions and inform decisions. For example, in all five planning units, the decision for any one preference pattern appears relatively insensitive to the uncertainty in relative sea level rise or to the potential patterns of development considered in this analysis. An example of this result can be observed in Planning Unit 2, Figures 23 through 25 and in Table 22. In this example, the plan that maximizes utility for PU-2:A (Plan 30, PU2-C-WBI-100-1) is the same regardless of differences in relative sea level rise or development. This lack of sensitivity of the preferred plan also was observed for PU-2:B and PU-2:C. In many instances, the scenarios produce changes in the rank ordering of the top few alternatives, but only minor changes in MAU. This suggests that stakeholders would be just as happy with any one of these alternatives despite these uncertainties in assumptions used to model performance outcomes. A similar lack of sensitivity was observed with respect to patterns of development. If the uncertainties in relative sea level rise or the pattern of development have been understated, these results and conclusions may not hold. There are also other possible development states that exist that have not been considered in this analysis and the insensitivity of the decision to the two states that have been considered should not be viewed as an indication of sensitivity in other possible states. In addition, if other uncertainties exist in the modeling of performance outcomes that are more important than those considered here, these uncertainties should be considered in future analyses.

One pattern apparent in these results is the consistently high rank given to non-structural plans in Planning Units 1 and 3a (See Section 5). It is worth considering why these non-structural plans are so consistently preferred in these planning units. Non-structural plans include raising in-place and buying out properties. Buying out the properties at risk of flooding from storm surge eliminates the risk, simultaneously removing the residential population from the flood-prone area and eliminating the potential for disruptions to employment in that area. This is accomplished

without causing direct wetland impacts or negative indirect environmental impacts. Therefore, it is easy to see why these alternatives may be attractive given the objectives hierarchy and performance metrics chosen for this analysis. However, these results should be interpreted with caution because there may be unaccounted impacts associated with these alternatives. The evaluation of metrics for the non-structural plans does not account for direct wetland impacts or indirect environmental impacts that might be caused by creating development elsewhere. In addition, it assumes that the new developments would not be subject to flood risks, which is unknown. The employment effects associated with displacing businesses or industries have not been evaluated for these plans. Finally, the social impacts associated with breaking up communities that have evolved in buyout areas over time have not been considered in the objectives hierarchy. Therefore, any apparent preference for non-structural plans indicated by these results should be considered carefully.

While considerable effort has gone into estimating the performance outcomes reflected in these metrics, most observers will perceive that there is much uncertainty in these estimates that has not yet been addressed and that a more comprehensive analysis of uncertainty is possible. Therefore, while the LACPR decision strategy emphasizes the ranking of plans by MAU, these results should be interpreted with some caution. For example, rather than attempting to identify "the preferred plan," a more cautious interpretation of these results would focus on identifying which plans form a top tier of plans with the highest MAU scores in each planning unit. It is also important to understand what the common elements of these plans are and how and why these top tiers differ across preference patterns.

One of the benefits of subjecting policy decisions such as those being considered in LACPR to a multi-attribute decision analysis and stakeholder involvement is that it helps decision makers to identify where common interests exist and where and how bridges can be built to unite stakeholders who hold competing views. In this case, comprehensive plans are top-ranked across all three preference patterns for PU4. Plan PU4-C-G-100-1 (Plan 13) is the top-ranked plan in PU-4:A and the second-ranked plan in PU4-C. Similarly, comprehensive plan PU2-C-R-400-3 (Plan 27) is top-ranked in PU-2:C, ranked fifth or sixth in PU-2:B and ninth for PU2-A. This result implies that these plans each offer a set of outcomes about which stakeholders who hold substantially different preference patterns could agree. Therefore, these plans deserve further

investigation. However, it is important to note that although a plan may have a high rank over a large number of preference patterns, the utility of that plan for one or more of those preference types may be substantially lower than for others. In this case, consideration should be given to how large these differences in utility are, whether or not these differences represent an inequity, and to what extent this outcome may be the product of having considered only a limited scope of decision alternatives.

8. Path Forward

This version of the MCDA document for LACPR represents a second iteration of MCDA for this planning process. In this revision, the LACPR Technical Team has made several important improvements. We have modified the objectives hierarchy and revised the metric set, eliminating some of the redundancy in the first iteration by combining or eliminating metrics and improving the quality of the metric definitions so that they are easier for stakeholders to understand. We have also reduced the number of qualitative metric scales.

The LACPR Technical Team re-engaged stakeholders in July 2008, to conduct additional weight elicitation sessions. In this round of stakeholder interaction, we used a much-improved survey instrument to obtain swing weights. The swing weight method improves on the direct weight elicitation method used in previous weight elicitation session by providing stakeholders with information on the range of outcomes associated with the alternatives under consideration. In this method, stakeholders are made explicitly aware of the tradeoffs they are making.

The LACPR Technical Team also implemented controls during the weight elicitation procedure. The team followed a script so that the procedure is consistently applied from one implementation to another and is documented. The team introduced tests to validate swing weights. Following the elicitation of swing weights, respondents completed a second weight elicitation activity in which they adjusted the ratings of potential metric improvements until they were satisfied with implied willingness-to-pay amounts for these improvements. These results largely confirm the results obtained from swing weighting. Stakeholders also completed a series of choice experiments in which stakeholders considered two alternatives that differed in terms of the ten

metrics and then chose a preferred alternative. The LACPR Technical Team was able to predict the outcome of choice experiments using the swing weights and multi-attribute utility model most of the time.

Although a number of improvements have been made, continued use of MCDA as an approach for informing planning decisions will provide the opportunity to make further improvements to the application of MCDA for hurricane risk-reduction planning. An iterative approach to developing the use of MCDA is justified by the complexity of this decision and the potential costs and consequences of the decision alternatives. The clarifications and improvements that will be pursued as it is appropriate and possible to do so will include:

- Continuing to engage stakeholders, requesting their feedback on the results of the MCDA.
- Expanding the discussion of the MCDA method, emphasizing the concept of tradeoffs and stakeholder indifference among outcomes.
- Enhancing the discussion of the weight elicitation procedure emphasizing validation of the weights (ability to predict choice set selections) and the impact of indirect monetization on the swing weights.
- Directing additional attention to analyzing preference patterns, discussing what attributes of the LACPR plans cause them to have the highest utility given a particular preference pattern, especially non-structural plans.
- Investing additional effort on focusing and optimizing the objectives hierarchy and the evaluation of metrics used for LACPR, including challenges associated with 1) using multiple monetary metrics, 2) the use of a construction time metric; 3) missing metrics that may account for the environmental, social, and employment consequences of displacing development under the non-structural plans.
- Further analysis of relevant uncertainties. The scope of uncertain inputs to the analysis should be re-evaluated to confirm that the inputs selected for the analysis of uncertainty are indeed the most important ones. Presently, the analysis considers only three uncertain inputs (relative sea level rise, employment growth rate, and population dispersion). If necessary, additional inputs should be evaluated and the process for selecting these inputs to the analysis should be documented. The analysis should consider not only the scenarios

associated with most extreme outcomes, but also the most probable scenarios. When manipulating these inputs to generate the scenarios, the scenarios should encompass the full range of potential values that might actually be realized during the planning horizon. A joint probability distribution for the scenarios can then be derived for the scenarios and the decision can be framed to maximize expected utility. Since probability distributions for uncertain inputs to the analysis are not well known, a sensitivity analysis should be conducted varying the parameters of the input probability distributions.

The experience and insights gained by the LACPR Technical Team using MCDA emphasize the importance and value of using such a structured approach to facilitate stakeholder engagement and decision making. An MCDA process provides the means for achieving productive engagement with stakeholders while providing the mechanics for eliciting specific forms of information that are useful for planners and decision makers. Continued engagement using this approach also provides basis for building educational and outreach process with the public and partnering organizations.

A comprehensive systems approach which also employs adaptive management pursues collaborative engagement with stakeholders, while seeking to design, construct, maintain and update engineered systems to be more robust with respect to future conditions. Here we emphasize the role MCDA can play within an overall adaptive management structure within the LACPR as a mechanism for addressing uncertainties within planning and, ultimately, the performance of the selected measures. In this sense, adaptive management transcends the planning process and encompasses the full life-cycle of LACPR, from planning through construction and operations and maintenance. The quantitative nature of MCDA provides a practical means for translating information regarding plan performance, which is collected over time, into a form that is relevant to future management decisions.

Attachment 1 – Stakeholder Workshop Participants

Table A1-1. Abbeville Participants 28 July: 21 participants

Name	Organization
Gerry Bodin	Private Citizen
Ronnie Bodin	Private Citizen
Charles Broussard	Vermilion Parish
Rebecca Broussard	Vermilion Parish Office of Homeland Security and Emergency Preparedness
Juanita Constible	National Wildlife Federation
Chad Courville	Miami Corporation
Tim Creswell	Vermilion Parish Office of Homeland Security and Emergency Preparedness
Daniel Didier	Natural Resources Conservation Service
Bob Gramling	University of Louisiana
Mandy Green	CPRA – Planning Branch
Lynn Guillory	Greater Abbeville-Vermilion Chamber of Commerce
Gwen Lanoux	FARM
Joseph LeBlanc	CPRA – Planning Branch
James R. LeLeux, Sr.	Vermilion Parish Cattlemen's Association
Troy Mallach	Natural Resources Conservation Service
Summer Martin	CPRA
Donald Menard	Town of Erath
Randy Moertle	McLlhenny Co./Avery Island, Inc.
Robert Rusho	Private Citizen
Sherrill Sagrera	Vermilion Parish CRAC

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MCDA Attachment 1 – Stakeholder Workshop Participants

Table A1-2. Lake Charles Participants 29 July: 17 participants

Name	Organization
Kirk Burleigh	Cameron Parish Police Jury
John Coppock	Calcasieu Parish Police Jury
Jennifer Grand	Ducks Unlimited, Inc.
Glenn Harris	SW Louisiana NWR Complex
Channing Hayden	Lake Charles Harbor and Terminal District
Courtney Hearod	U.S. Senator David Vitter
Tom Hess	LDWF
Earnestine Horn	Cameron Parish Police Jury
Dan Llewellyn	OCPR/CPRA
Randy Moertle	Little Lake Land Company/M.O. Miller Estates
David Richard	LLA
Dean Roberts	Stream Companies
Chris Simon	Simon and Delany
Natalie Snider	Coalition to Restore Coastal Louisiana
Rusty Vincent	CCA-LA
Donald Voros	US Fish and Wildlife Service
Carolyn Woosley	Coalition to Restore Coastal Louisiana

Table A1-3. New Orleans Participants 30 July: 44 participants

Name	Organization
David Cagnolatti	ConocoPhillips
Emily Campbell	ConocoPhillips
Paul Carroll	St. Tammany Parish Government
Brad Case	City of New Orleans
John Davis	Home Owners Association
Morgan Elzey	Common Ground Relief
Alexander Evans	Louisiana Recovery Authority
Kurt Evans	City of Kenner
Brian Fortson	St. Tammany Parish Government

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MCDA Attachment 1 – Stakeholder Workshop Participants

Name	Organization
P.J. Hahn	Plaquemines Parish Government
Maurice Jordan	Tangipahoa Parish
Debbie Kelly	COPE
KC King	CHAT
John Koeferl	CAWIC
Shirley Laska	University of New Orleans
Carrie Bet Lasley	UNO-CHART
John Lopez	Lake Pontchartrain Basin Foundation
William McCartney	St. Bernard Parish Government
Randy Moertle	Biloxi Marsh Lands Corporation
Tina Morgan	OCPR
James Murphy	U.S. Maritime Administration
David Muth	NPS – Jean Lafitte NHP
Earthea Nance	City of New Orleans
Donald Olson	Citizen for a Safer Jefferson Parish
Paul Oncale	St. John the Baptist Parish
Amanda Phillips	Edward Wisner Donation
Mark Popovich	Shannon & Wilson
Gary Rauber	Lake Catherine Civic Association
Brittany Rojas	DOTD
Matt Rota	Gulf Restoration Network
Charlotte Ruiz	Citizens for a Safer Jefferson and Metairie Lake
Aloma Savastano	COPE
Mark Schexnayder	LA Sea Grant/Louisiana State University Agriculture Center
Mark Schleifstein	The Times-Picayune
Sam Scholle	St. Charles Parish
John Shadding, Jr.	City of Westwego
Judith Shaddinger	City of Westwego
DeEtte Smythe	St. Tammany Parish Government

Louisiana Coastal Protection and Restoration (LACPR) Final Technical Report
MCDA Attachment 1 – Stakeholder Workshop Participants

Name	Organization
VJ St. Pierre	St. Charles Parish
Kelley Templet	OCPRA
Lou Vaughn	St. John Parish Planning and Zoning
John Wilson	Sewerage & Water Board of New Orleans
Marnie Winter	Jefferson Parish Environmental Affairs
Ann Yoachim	Tulane Institute on Water Resources Law & Policy

Table A1-4. Houma Participants 31 July: 32 participants

Name	Organization
Jane Arnette	SCIA
Gary Beadle	Town of Berwick
Steve Becnel	J Ray McDermott
Karim Belhadjali	CPRA
Henri Boulet	LA 1 Coalition
David Bourgeois	LA Sea Grant Marine Extension Program/Louisiana State University Agriculture Center
Nikki Buskey	The Houma Courier
Carl Callahan	City of Morgan City
Chett Chiasson	Port Fourchon
Crystal Chiasson	Lafouche Parrish Government
Kermit Coulon	LL&E/ConocoPhillips
Daniel Dearmond	LDNR
Jammie Favorite	CPRA
Alan Gibson	Buquet Corp.
Wes Kungel	Senator Mary Landrieu
Shane Landry	St. James Parish
Darin Lee	CPRA
Al Levron	Terrebonne Parish Government

Louisiana Coastal Protection and Restoration (LACPR) Final Technical Report
MCDA Attachment 1 – Stakeholder Workshop Participants

Name	**Organization**
Greg Linscombe	Continental Land & Fur Company
Danny Lott	J Ray McDermott
Robert Mahoney	FHWA
Nicholas Matherne	Lafourche Parish Government
Phil Schexnayder	Gulf South Engineers, Inc.
James Setze	Federal Highway Administration
Cindy Steyer	Natural Resources Conservation Service
Leslie Suazo	Terrebonne Parish Government
Jeri Theriot	Congressman Melancon
Cyrus Theriot, Jr.	Harry Bourg Corp.
Luke Theriot	U.S. House of Representatives, LA-03
Kevin Voisin	Motivatit Seafoods, LLC
Paul Yakupzack	Terrebonne Parish – CZM

Attachment 2 –Stakeholder Workshop Script

Louisiana Coastal Protection and Restoration (LACPR) Final Technical Report
MCDA Attachment 2 – Stakeholder Workshop Script

Slide: Introduction to LACPR

Louisiana Coastal Protection and Restoration (LACPR)
Stakeholder Preference Assessment
State-wide Stakeholder Meetings
July 2008

Thanks for contributing your time, once again, and assisting us in identifying a good solution to meet the hurricane risk reduction needs of coastal Louisiana.

Slide: Purpose

We have one main purpose today: to capture your organization's preferences to assist us in identifying the best hurricane risk reduction system for coastal Louisiana.

Those of you that participate in the last session really helped the project planners refine our thinking on viable alternatives.

Your input from the last session was peer reviewed and incorporated into the project planning.

Those of you new to the process, we thank you for attending today and look forward to gaining from your valuable insight.

I want to stress that we are NOT voting today, we are assessing preferences through an objective process (recommended by the National Academy of Sciences) known as swing weighting.

Preferences are the key to understanding this process. We are asking you to make trade-offs among a set of performance outcomes for the hurricane risk reduction system. We will use these results to determine the outcomes that are most important to you. This will assist us in selecting the final alternatives we present in our report to the Assistant Secretary of the Army.

Slide: Since we last met…

We used the information from the last preference assessment to reduce the number metrics (removing 4 that had no impact on project selection).

We refined our planning options to better reflect the stakeholder preferences.

As I said, the metrics, process and results were externally reviewed and the remaining metrics represent valuable factors for our final decisions. We reduced the metric set from 14 to 10.

Slide: Agenda

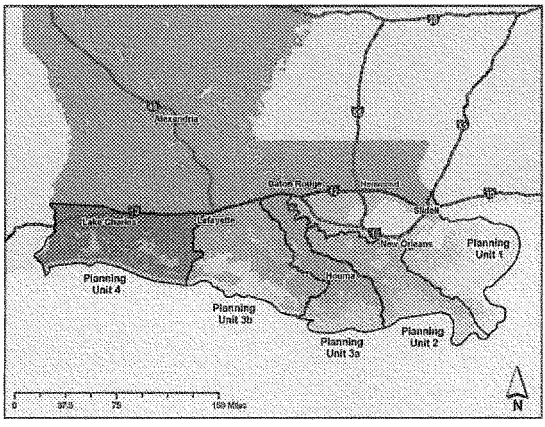
Brief introduction on status of LACPR Project

- Review metrics
- Introduce the preference assessment tool

- Capture information about your preferences
- Additional input for other planning units
- Review the path ahead

If you can only make this one session, but have input for other planning units, you will have the opportunity to provide input for each planning unit here today, if you wish.

Slide: Planning Area



We have 5 planning areas, planning area 3 was split early in the planning process and treated as 3a and 3b. We will be gathering input BY PLANNING AREA, and you will have a chance to provide information on your preferences for any or all areas.

Slide: General Categories of Alternatives

- No Action
- Coastal Restoration Only
- Non-Structural + Coastal Restoration
- Structural + Coastal Restoration
- Comprehensive Alternatives = Coastal Restoration + Non-Structural + Structural

Each alternative represents a collection of risk reduction measures that were screened prior to formulating alternatives to ensure consideration of the most effective and efficient plans. The information you provide today will have a significant effect in determining which alternatives provide the most desired result.

Two Slides: Path Ahead

- Identify the combination of plans that represent the most viable options for risk reduction for the state as a whole
- Develop supplemental information on alternative rankings and incremental plan performance
    - Planning team will consider additional combinations of life cycle project costs and risk reduction benefits (property, health and safety)
- Present all information to Corps decision-makers
    - Consider stakeholder preference patterns
    - Consider incremental cost analysis
    - Consider MCDA performed in real-time
    - Consider, rank and select plans
- Final Technical Report (FTR) will include:
    - External peer review
    - Refined evaluation data
    - Systems modeling analysis (LACPR and MSCIP)
    - Additional stakeholder engagement
    - Multi-Criteria Decision Analysis
    - Expanded risk assessment
    - Limited recommendations for further study
- Report to Chief of Engineer's

Slide: Introduction to Stakeholder Preference Assessment

I am going to provide a brief overview of:

- Why we need your input,
- The decision making tool we are using,
- How that tool is used by way of a car-buying example, and
- An overview of the survey instrument using the car buying example.

Slide: Why We Need Your Input

- We have characterized each alternative plan in terms of its performance with respect to selected metrics
- We need input from your organization on how much importance to place on each of these performance outcomes
- Your organization's opinions count!

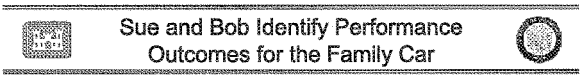
Slide: Multi-Criteria Decision Analysis

MCDA is a tool for structuring and analyzing complex decisions. It is a tool that can be used to help make a decision.

Within MCDA, emphasis is given to:

- Defining the problem
- Establishing desired objectives
- Identifying metrics to represent progress toward those objectives
- Assessing the relative importance of those objectives
- Determining the level of satisfaction that stakeholders would derive from each alternative

Slide: Buying a Car: Sue and Bob Identify Performance Outcomes for the Family Car



This is a simple decision I think we can all identify with: buying a car. What do Sue and Bob Jones want in a new car? They listed their desired performance metrics that are important to them. In this case, they identified the following measures of performance:

- Purchase cost ($)
- Resale value after three years (% of original price)
- Annual repair/maintenance cost ($/year)
- Fuel efficiency (mpg)
- Interior volume (cubic feet)
- Style and comfort (qualitative) (poor, fair, good, finest)
- NHTSA safety rating (1 (worst) to 5 (best))

Slide: Sue and Bob Identify their Alternatives

Sue and Bob Identify their Alternatives

Metric	Units	Outcome: Worst	Outcome: Best
Cost	Dollars	45,000	12,000
Resale Value After Three Years	% of Original Value	33	57
Repair/Maintenance Cost Per Year	Dollars	1,000	300
Fuel Efficiency	MPG	15	35
Interior Volume	ft^3	80	170
Style and Comfort	Qualitative	Poor	Finest
NHTSA Safety Rating	Scale (1-5); 1 is lowest	2	5

One Team: Communicating, Collaborating, Consensus

Sue and Bob determined the best and worst possible outcomes for their alternatives. The alternatives are a set of specific cars that they are interested in buying. No alternatives are worst or best in terms of all performance metrics. So they listed the best and worst potential outcomes for each of their performance metrics. Note that the worst outcome is not the outcome associate with a particular alternative. It is a hypothetical worst case outcome given the range of possible performance on each metric.

Slide: Sue and Bob Rank the Potential Improvements in the Worst Outcome

Sue and Bob Rank the Potential Improvements in the Worst Outcome

Sue Jones			Bob Jones		
Metric	Worst Outcome	Improve to:	Metric	Worst Outcome	Improve to:
Purchase cost ($)	$45,000	$12,000	Fuel efficiency (mpg)	15	35
Fuel efficiency (MPG)	15	35	Safety rating (1-5)	2	5
Safety rating (1-5)	2	5	Purchase cost ($)	$45,000	$12,000
Interior volume (ft^3)	80	170	Resale value (%)	33	57
Resale value (%)	33	57	Interior volume (ft^3)	80	170
R&M cost ($/year)	$1,000	$300	R&M cost ($/year)	$1,000	$300
Style (qualitative)	Poor	Finest	Style (qualitative)	Poor	Finest

One Team: Communicating, Collaborating, Consensus

Sue and Bob ranked the potential improvements to the hypothetical worst possible outcome. They ranked them in terms of how important each potential improvement is to them. Sue is most concerned about purchase cost and fuel efficiency, while Bob is most concerned with fuel efficient and safety. Note that they have difference rankings. Sue notes that there is a $33,000 potential improvement to purchase cost and this is her most important potential improvement. The next most important is fuel efficiency, etc.

Slide: Sue and Bob Rate the Potential Improvements in the Worst Outcome

Sue and Bob Rate the Potential Improvements in the Worst Outcome

Sue Jones			Bob Jones		
Metric	Improvement	Rating	Metric	Improvement	Rating
Purchase cost ($)	-$33,000	100	Fuel efficiency (mpg)	+ 20 mpg	100
Fuel efficiency (MPG)	+ 20 mpg	67	Safety rating (1-5)	+ 3 steps	100
Safety rating (1 - 5)	+ 3 steps	67	Purchase cost ($)	-$33,000	100
Interior volume (ft^3)	+ 90 ft^3	50	Resale value (%)	+ 24%	75
Resale value (%)	+ 24%	17	Interior volume (ft^3)	+ 90 ft^3	75
R&M cost ($/year)	- $700 /yr	17	R&M cost ($/year)	- $700 /yr	25
Style (qualitative)	+ 5 steps	17	Style (qualitative)	+ 5 steps	25

One Team: Communicating, Collaborating, Consensus

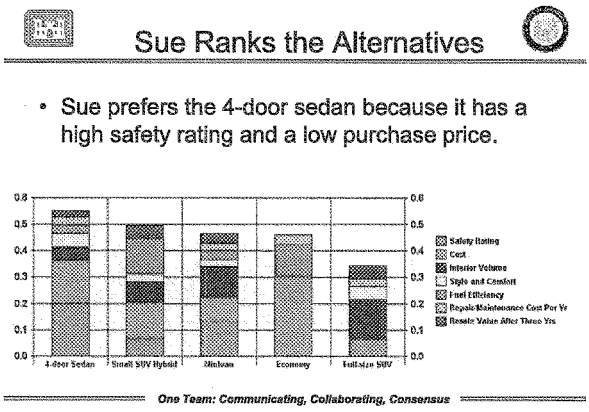
Sue and Bob then rate the potential improvements in terms of the relative importance to them. They give their top-ranked improvement a rating of 100. For Sue, this is the purchase cost. For Bob, this is fuel efficiency. Bob and Sue each rate the potential improvements in terms of how important it is to them relative to their top-ranked improvement.

Sue considers her second most important improvement relative to her top-ranked improvement. In this case increasing fuel efficiency 20 mpg is worth two-thirds as much to Sue as reducing the purchase price $33,000. Sue's third-ranked improvement is increasing the NHTSA Safety Rating. In this case, increasing the safety rating from 2 to 5, or three steps, is worth two-thirds as much as decreasing the purchase cost $33,000. Because Sue rates a three-step increase in the safety rating equally to the improvement in fuel efficiency, this means that she would be equally satisfied increasing the fuel efficiency 20 mpg as she would increasing the safety rating 3 steps.

Bob's top-ranked improvement is increasing the fuel efficiency 20 mpg. He gives the next two improvements -- increasing the safety rating 3 steps and reducing the purchase cost $33,000 – a rating of 100 also. This indicates that he values these two improvements just as much as increasing fuel efficiency 20 mpg. He gives the 24% increase in the resale value and the 90 ft^3 increase in the interior volume a rating of 75, indicating that he values these potential improvements only 75% as much as the first three possible improvements.

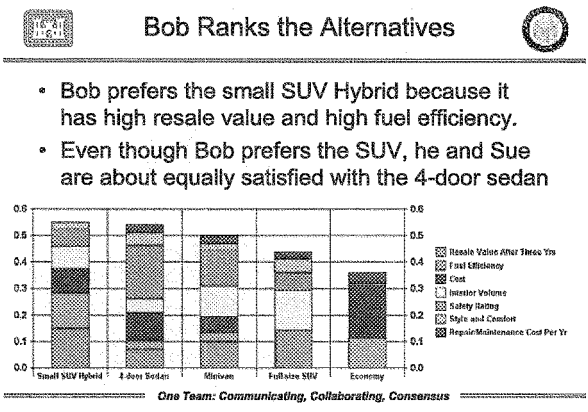
Are there any questions?

Slide: Car Buying Example: Sue Ranks the Alternatives



Since Sue emphasized cost and safety, these two metrics contribute most to the ranking of the top-ranked vehicle. As a result, the 4-door sedan is Sue's top ranked choice. Note her second ranked choice is the small SUV hybrid.

Slide: Car Buying Example: Using the Instrument



Bob rated fuel efficiency and resale value highest; thus these two metrics contribute most to his top-ranked vehicle, the small SUV hybrid. Note his second ranked choice is the 4-door sedan

and that these two choices have near identical rankings. For this reason, Bob and Sue will be roughly equally satisfied with the 4-door sedan as the small SUV hybrid.

What is accomplished here is that 5 car choices have been reduced to 2, allowing the Joneses to focus their choice between the 2 highest ranked vehicles. It must be emphasized that as this example shows, MCDA does not make the decision for you, it makes decision making easier and more transparent.

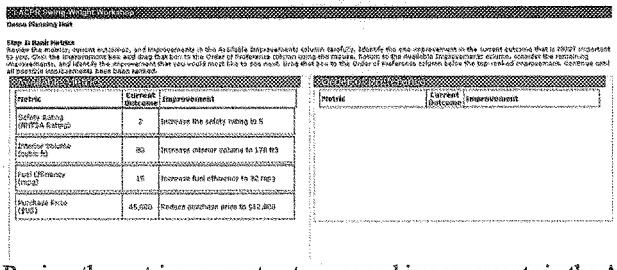
Slide: Car Buying Example: Using the Instrument

Swing weighting

- Step 1: Rank
- Step 2: Rate
- Step 3: Willingness-to-Tradeoff

We will demonstrate with the car buying example how you will use the instrument to provide your preferences.

Screen Shot: Step 1 Rank Metrics



Review the metrics, current outcomes and improvements in the Available Metrics column carefully.

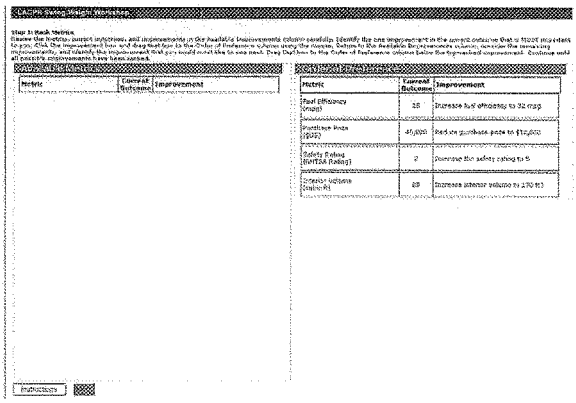
Column 1 titled "Metric" lists the metrics in a random order.

Column 2 titled "Current Outcome" lists a worst case outcome value for each metric.

Column 3 titled "Improvement" shows how the outcome values can be improved.

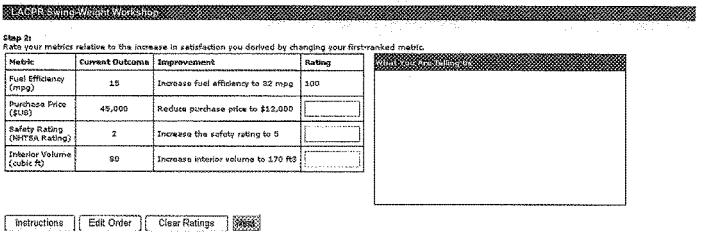
Identify the one improvement in the current outcome that is MOST important to you. Click the improvement box and drag that box to the Order of Preference column using the mouse.

Return to the Available Metrics column, consider the remaining improvements, and identify the improvement that you would most like to see next. Drag that box to the Order of Preference column below the top ranked improvement. Continue until all possible improvements have been made.



When you are satisfied with your ranking, click next.

Screen Shot: Step 2 Rate Your Metrics



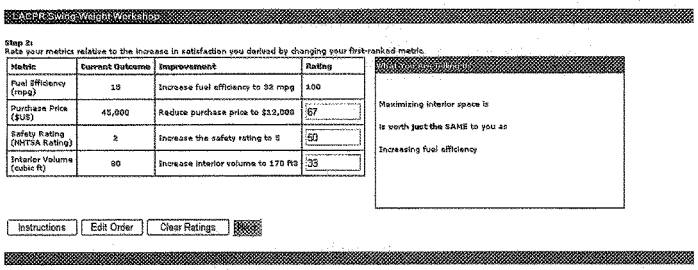
Rate the potential improvement in each metric relative to the increase in satisfaction you derived by changing your first-ranked metric.

Review the information in the "What You are Telling Us" dialogue box. This box describes the tradeoff that you are making. It describes the improvement you are making and says that you would derive the same level of satisfaction from this improvement as from some fraction of your top-ranked improvement.

We are demonstrating:

- If I rate all improvements 100, I am saying that they are all equally important to me
- If I put a 50 in the rating box, that means that I value the improvement half as much as the top-ranked improvement

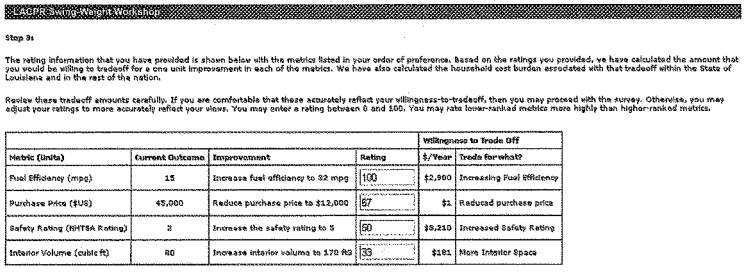
Screen Shot: Willingness to tradeoff



Note in the above screen grab that this is dollars for a one unit change in the metric.

The rating information that you have provided is shown here with the metrics listed in your order of preference. Based on the ratings you provided, we have used indirect monetization to calculate the dollar amount that you would be willing to tradeoff for a one unit improvement in each of the metrics.

Review these tradeoff amounts carefully. If you are comfortable that these accurately reflect your willingness-to-tradeoff, then you are done with this exercise. Otherwise, you may adjust your ratings to more accurately reflect your views. You may enter a rating between 0 and 100. You may rate lower-ranked metrics more highly than higher-ranked metrics.



The willingness to trade-off amount is the most that you would be willing to pay for a one-unit change in the performance outcome. For example, based on our ratings, the most we would be willing to trade in monetary terms for a one mpg increase in fuel efficiency is $2,900.

- The most that we would be willing to pay to reduce the purchase price $1 is $1.
- The most that we would be willing to pay to increase the safety rating one step is $8210.
- The most that we would be willing to pay to increase the interior volume 1 cubic foot is $181.

This means that I would be just as satisfied with increasing my fuel efficiency 1 mpg and having $2900.

Now suppose that I am dissatisfied with these willingness to trade-off amounts. I can change the ratings for each of the metric improvements. For example, suppose I think that a one step improvement in the safety rating is not worth $8210, I can reduce the rating on this metric improvement. Suppose I think it is worth only half as much, I would reduce my rating to 25. In that case, my willingness to trade off for a one step increase in the safety rating decreases to $4100.

Notice that my rating for this metric improvement is now lower than the rating for the next metric improvement (33). There are no restrictions that require higher ranked metric improvements to have a higher rank.

Now suppose that I reduce the rating on the purchase price from 67 to 30. This means that I value money less; therefore, the willingness to tradeoff amounts for all metric improvements increases. In other words, I am saying that money is worth less to me, therefore I'd be willing to trade more money for these other benefits. Increasing rating on cost improvement means I value money more highly, therefore my willingness to trade off amounts for all other possible improvements decreases.

LACPR Swing Weight Workshop

Step 9:

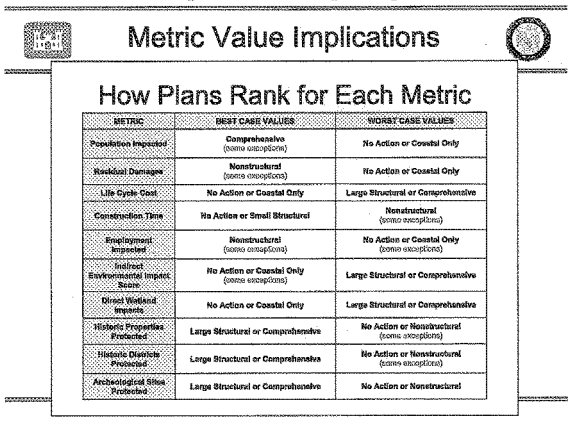
The rating information that you have provided is shown below with the metrics listed in your order of preference. Based on the ratings you provided, we have calculated the amount that you would be willing to tradeoff for a one unit improvement in each of the metrics. We have also calculated the household cost burden associated with that tradeoff within the State of Louisiana and in the rest of the nation.

Review these tradeoff amounts carefully. If you are comfortable that these accurately reflect your willingness-to-tradeoff, then you may proceed with the survey. Otherwise, you may adjust your ratings to more accurately reflect your views. You may enter a rating between 0 and 100. You may rate lower-ranked metrics more highly than higher-ranked metrics.

				Willingness to Trade Off	
Metric (Units)	Current Outcome	Improvement	Rating	$/Year	Trade for what?
Fuel Efficiency (mpg)	15	Increase fuel efficiency to 32 mpg	100	$INF	Increasing Fuel Efficiency
Purchase Price ($US)	45,000	Reduce purchase price to $12,000	0	$INF	Reduced purchase price
Safety Rating (NHTSA Rating)	2	Increase the safety rating to 5	25	$INF	Increased Safety Rating
Interior Volume (cubic ft)	80	Increase interior volume to 170 ft3	33	$INF	More Interior Space

If I put a 0 in the cost metric, am I saying that I do not value money at all (see above screen shot). Therefore, I'd be willing to pay an infinite amount of money for a one unit improvement of any metric. $INF stands for infinity.

Slide: Metric Value Implications
This slide was also provided to all participants as a handout.



Metric Value Implications

How Plans Rank for Each Metric

METRIC	BEST CASE VALUES	WORST CASE VALUES
Population Impacted	Comprehensive (some exceptions)	No Action or Coastal Only
Residual Damages	Nonstructural (some exceptions)	No Action or Coastal Only
Life Cycle Cost	No Action or Coastal Only	Large Structural or Comprehensive
Construction Time	No Action or Small Structural	Nonstructural (some exceptions)
Employment Impacted	Nonstructural (some exceptions)	No Action or Coastal Only (some exceptions)
Indirect Environmental Impact Score	No Action or Coastal Only (some exceptions)	Large Structural or Comprehensive
Direct Wetland Impacts	No Action or Coastal Only	Large Structural or Comprehensive
Historic Properties Protected	Large Structural or Comprehensive	No Action or Nonstructural (some exceptions)
Historic Districts Protected	Large Structural or Comprehensive	No Action or Nonstructural (some exceptions)
Archeological Sites Protected	Large Structural or Comprehensive	No Action or Nonstructural

- This Metric Value Implications chart describes (in general) which categories of plans would rank highest for the Best Case Metric Values (Best Performing Plans for that metric) and which categories of plans would rank lowest for the Worst Case Metric Values (Worst Performing Plans for that metric).
- These categories and their exceptions will be discussed in more detail once we discuss the individual metrics and their definitions.

Note:

- "Small" means limited area included in risk reduction measures and/or 100-yr level of risk reduction provided.
- "Large" means expanded area included in risk reduction measures and/or 400/1000-year level of risk reduction provided.

Slides: Overview of Metrics and their Definitions

Handouts: The following three pages were provided to all participants as handouts before beginning each session. The metrics, units, definitions, metric value implications, and worst case outcome and best case improvement for each of the five planning units that are described in the handouts were shown to participants using PowerPoint slides before starting the survey instrument.

Louisiana Coastal Protection and Restoration (LACPR) Metrics
Page 1 of 3

Metric (Units)	Population Impacted (# of people/year)				
Metric Definition	The number of residents who would experience any amount of flooding after implementation of an alternative plan. This metric represents the residual risk to health and safety of the residential population impacted.				
Metric Value Implications	In general, the worst case value for this metric represents no action. All risk reduction measures (coastal, nonstructural, and structural) provide improvement in value for this metric. However, because raise-in-place components do not eliminate risk to people, nonstructural measures may not be the most effective in reducing this metric value.				
Planning Unit	1	2	3a	3b	4
Worst Case Outcome	55,748	31,441	20,522	8,345	5,279
Best Case Improvement	25,257	7,845	5,049	1,526	1,698

Metric (Units)	Residual Damages ($ Millions/year)				
Metric Definition	The remaining risk to assets from flooding after implementation of an alternative plan. Residual damages include damages to residential and non-residential properties, emergency response costs, losses to agricultural resources, and damages to transportation infrastructure.				
Metric Value Implications	In general, the worst case value for this metric represents no action. All risk reduction measures (coastal, nonstructural, and structural) provide improvement in value for this metric.				
Planning Unit	1	2	3a	3b	4
Worst Case Outcome	2,129	2,285	1,221	529	465
Best Case Improvement	151	110	149	70	87

Metric (Units)	Life Cycle Cost ($ Millions/year)				
Metric Definition	The total cost of implementing an alternative plan, which includes engineering and design, construction, facility relocation, operations and maintenance, real estate, and mitigation costs. State and local costs would be 35% or more of the total cost.				
Metric Value Implications	The best case value for this metric represents no action. All risk reduction measures (coastal, nonstructural, and structural) serve to increase the value for this metric.				
Planning Unit	1	2	3a	3b	4
Worst Case Outcome	3,777	3,147	2,765	1,857	1,388
Best Case Improvement	0	0	0	0	0

Metric (Units)	Construction Time (Years)				
Metric Definition	The length of time required to design and construct an alternative plan so that most of its intended benefits are realized.				
Metric Value Implications	The best case value for this metric represents no action. All risk reduction measures (coastal, nonstructural, and structural) serve to increase the value for this metric.				
Planning Unit	1	2	3a	3b	4
Worst Case Outcome	16	15	15	15	15
Best Case Improvement	0	0	0	0	0

Louisiana Coastal Protection and Restoration (LACPR) Metrics
Page 2 of 3

Metric (Units)	Employment Impacted (# of jobs disrupted/year)				
Metric Definition	The number of jobs that would be disrupted for one or more days as a direct consequence of flooding after implementation of an alternative plan.				
Metric Value Implications	In general, the worst case value for this metric represents no action. All risk reduction measures (coastal, nonstructural, and structural) provide some improvement in value for this metric.				
Planning Unit	1	2	3a	3b	4
Worst Case Outcome	11,040	9,325	6,024	2,358	1,105
Best Case Improvement	411	300	557	308	225

Metric (Units)	Indirect Environmental Impact Score (Unit-less scale: -8 to +8)				
Metric Definition	The severity of potential aquatic ecosystem impacts (positive or negative) relative to other alternatives in the planning unit. This metric considers impacts to hydrology, fisheries, the potential to induce development of wetlands, and consistency with coastal restoration goals. Qualitative scores fall within the following ranges: -8 to -5 = Highly adverse impact, -4 to -1 = Moderately adverse impact; 0 = No impact (or sum of positive and negative impacts equal to zero); 1 to 4 = Moderately positive impact; 5 to 8 = Highly positive impact.				
Metric Value Implications	The no action value for this metric is represented by zero. The relative influence on the value for this metric varies for structural risk reduction measures. Nonstructural and coastal measures do not produce any value for this metric.				
Planning Unit	1	2	3a	3b	4
Worst Case Outcome	-8	-8	-7	-8	-6
Best Case Improvement	0	4	0	2	0

Metric (Units)	Direct Wetland Impacts (acres)				
Metric Definition	The amount of wetlands that would be displaced by an alternative plan. The acreage impacted includes the levee footprint and adjacent borrow areas used for levee construction. These wetland impacts would be offset by creating more acres of wetlands within the impacted basin.				
Metric Value Implications	The best case value for this metric represents no action or no structural risk reduction action. Nonstructural and coastal measures do not produce any value for this metric. Structural measures serve to increase values for this metric.				
Planning Unit	1	2	3a	3b	4
Worst Case Outcome	9,100	9,500	6,600	5,200	2,500
Best Case Improvement	0	0	0	0	0

Louisiana Coastal Protection and Restoration (LACPR) Metrics
Page 3 of 3

Metric (Units)	Historic Properties Protected (# of properties)				
Metric Definition	The number of historic properties protected by an alternative plan. Historic properties include those listed or eligible for listing on the US Park Service's National Register of Historic Places or register of National Historic Landmarks. Historic properties are protected by hurricane risk reduction alternatives that reduce land loss, erosion, and flooding.				
Metric Value Implications	The worst case value for this metric represents no action. All risk reduction measures (coastal, nonstructural, and structural) provide some improvement in value for this metric.				
Planning Unit	1	2	3a	3b	4
Worst Case Outcome	119	11	0	2	0
Best Case Improvement	159	27	18	20	3

Metric (Units)	Historic Districts Protected (# of districts)				
Metric Definition	The number of historic districts protected by an alternative plan. Historic districts encompass living communities consisting of clusters of historic buildings and/or other structures that share a similar date or theme. Historic districts are protected by hurricane risk reduction alternatives that reduce land loss, erosion, and flooding.				
Metric Value Implications	The worst case value for this metric represents no action. All risk reduction measures (coastal, nonstructural, and structural) provide some improvement in value for this metric.				
Planning Unit	1	2	3a	3b	4
Worst Case Outcome	38	0	0	0	0
Best Case Improvement	52	9	1	5	0

Metric (Units)	Archaeological Sites Protected (# of sites)				
Metric Definition	The number of archeological sites protected by an alternative plan. Archeological sites may include the remains of buildings, trash pits, hearths, pottery and tools (stone, metal and other materials). Archeological sites are protected by hurricane risk reduction system alternatives that reduce land loss, erosion, and flooding.				
Metric Value Implications	The worst case value for this metric represents no action. All risk reduction measures (coastal, nonstructural, and structural) provide some improvement in value for this metric.				
Planning Unit	1	2	3a	3b	4
Worst Case Outcome	111	42	72	14	29
Best Case Improvement	363	502	203	312	140

Introduction for the Survey Instrument

Tradeoffs are an inherent part of most decisions. For example, when we buy a car, we want the nicest car money can buy. However, if our supply of money is limited, we must choose from among the available amenities. Everybody is willing to pay more for some amenities than others. For example, some people are willing to pay more for safety features than speed or style. Others value speed and style over safety. Still others are willing to sacrifice speed, style, and safety to save money. The car that we eventually purchase represents a compromise that reflects our individual preferences, or our willingness to make tradeoffs among the various amenities that are available to us.

1. Screen Shot: Log-in

This is the log-in screen. We ask that you complete all fields, but only your first and last name, your organization's name and planning unit are required. Your responses to this survey instrument are specific to that planning unit. You may repeat the survey for additional planning units after you have completed your first survey.

All of you have been invited to represent your organization's views in this survey. Therefore, please respond to this survey considering your organization's views. However, if you are representing yourself rather than your organization, please indicate this when you login. Individual input will receive equal consideration in our analysis of the alternatives.

This log-in information will be retained to document your attendance and will be stored separately from your responses to the survey. Your responses to the survey will not be published or otherwise released along with any information that might be used to identify you.

Click create account.

2. Screen Shot: Initial Survey

These survey questions will help us understand why some people's weights are different than other people's weights. Read each question and fill-in the button that describes how strongly you agree or disagree with each statement.

Your responses to the initial survey will not be published or otherwise released along with any information that might be used to identify you.

You must provide answers to all questions before you will be allowed to proceed.

Click complete survey and proceed.

3. Screen Shot: Step 1 Rank Metrics Screen

Introduction

In this activity you will consider a set of outcomes from the LACPR decision in a planning unit and you will be asked to rank the importance of various improvements in ten metrics in order of your organization's preferences.

Column 1 titled "Metric" lists the metrics in a random order (refer to the handout for a more detailed description of these metrics).

Column 2 titled "Current Outcome" lists a worst case outcome value for each metric.

Column 3 titled "Improvement" shows how the outcome values can be improved.

Carefully consider the outcome and the potential improvements in that outcome that are available to you. Choose the improvement in Column 1 that describes the change that you would MOST like to see. Drag it over to the bottom right, under "Order of Preference." Review the information in the "What You are Telling Us" dialogue box. If you agree with the statement, click the Close button. Otherwise, move the metric row up or down within the "Order of Preference" list or back to the list of "Available Metrics." Repeat this process until all the items have been moved to the right. If at any time you decide that you don't like the order of the metric rows, you can adjust the ranks by selecting a row and moving it up or down the list. Each time you move an item, you will need to re-confirm that you agree with the statement in the dialogue box. After all possible improvements have been ranked, you may proceed to the next step.

What to Do If You Make a Mistake
If at any time you decide that you don't like the order of the list in Columns 4-6, you can adjust the ranks by selecting a tab and moving it up or down the list. You can also move the tab back to the "Available" Column. Each time you re-rank an item, you will need to re-confirm that you agree with the statement in the dialogue box. You are done after you rank all possible improvements.

When you are finished, click next.

4. Screen Shot: Step 2 Rating Screen

Listed below in Columns 1 - 3 are the metrics, outcomes, and improvements in the order that you provided in the last screen. Your top-ranked improvement has been given a rating of 100.

Consider the next possible improvement and rate how important that improvement is relative to your top ranked improvement. For example, if that improvement would be equally important to you as your top-ranked improvement, then place a 100 in the space provided. If that improvement would be worth only half as much to you, place a 50 in the space provided. If that improvement would be worth nothing to you, place a 0 in the space provided. Assume the

improvements would occur with all other metric outcomes, including your top-ranked metric outcome, at their hypothetical level.

You may assign a rating between 0 and 100. No lesser ranked improvement may receive a rating that is greater than the one above it.

If at any time you would like to revise your order of preference in this table, you may click the Edit Order button provided to return to the previous step in which you ranked the improvements to metric outcomes. If you wish to revise some of your ratings, you can type over them, or if you wish to clear all of your ratings, you can click the Clear Ratings button.

When you are finished, click next.

5. Screen Shot: Step 3

On the next page, we will show a table (also shown below) that lists:

- the metric;
- the current outcome;
- the improvement;
- your current rating for each metric;
- the national maximum willingness-to-tradeoff (WTT) for a unit improvement in each metric implied by your ratings;
- the average household WTT within the State of Louisiana and the rest of the nation that would be needed to support your assessment of the national maximum WTT.

Based on your responses in the previous section, we have inferred what you believe to be the aggregate national maximum WTT for a one unit improvement in each metric. Your maximum WTT for something depends upon your personal values. It is the most money that you believe the nation would be willing to pay in exchange for achieving a unit of improvement in each metric outcome. In other words, it means that the nation would derive the same level of satisfaction from having that sum of money as from achieving the indicated improvement. **This amount does not represent the actual cost.**

For example, if you rated a 50 acre decrease in wetland acreage lost and mitigated twice as highly as $100 million per year reduction in life-cycle costs, your WTT in monetary terms for that increase in wetland acreage would be twice the potential reduction in life-cycle cost, or $200 million per year. Your WTT for a one acre change in the area of wetlands lost and mitigated would be $200 million per year divided by 50 acres, or $4 million per wetland acre per year. This is the most you would be willing-to-tradeoff for a one unit improvement in the metric, not the actual cost of that improvement. The table shows the average household maximum WTT that would be required to support your assessment of the national aggregate maximum WTT. These estimates reflect an allocation of 35% of the WTT amount, the approximate state cost share, to Louisiana households and the remainder to the nation as a whole.

In the next task, you will carefully consider the amounts in your WTT column. If you are satisfied with each WTT amount, then do nothing. However, if you are not satisfied with the tradeoff amount, you may edit the rating.

Click next.

6. Screen Shot: Step 3 Continued

The rating information that you have provided is shown below with the metrics listed in your order of preference. Based on the ratings you provided, we have calculated the Total WTT amount for a one unit improvement in each of the metrics. To help you interpret these large numbers, we have also calculated the average household WTT required to support the total national WTT within the State of Louisiana and in the rest of the nation.

Review these tradeoff amounts carefully. If you are comfortable that these accurately reflect your willingness-to-tradeoff, then you may proceed with the survey. Otherwise, you may adjust your ratings to more accurately reflect your views. You may enter a rating between 0 and 100. You may rate lower-ranked metrics more highly than higher-ranked metrics.

- If you change the rating for an improvement in a metric other than life-cycle cost, the WTT amount for that metric will update.
- If you change the rating for the life-cycle cost improvement, all WTT amounts will update except the amount for the life-cycle cost metric. This is because improvements in the life-cycle cost are the reference variable.
- If you rate an improvement in any metric other than life-cycle cost 0, this implies that you do not value improvements in this metric at all and therefore, would not be willing to trade money for any amount of improvement.
- If you rate an improvement in the life-cycle cost metric 0, this implies that you do not value money at all and would therefore be willing to pay an infinite amount for a unit improvement in any metric. In this case, you would see $INF in the WTT column.

Your responses to this portion of the survey are in no way constrained by your previous responses.

When finished, click I am satisfied with my ratings and wish to proceed.

7. Screen Shot: Step 4 Choice Experiments

You are being asked to make a series of ten choices between two possible decision outcomes. Carefully consider the two possible decision outcomes shown in the table below. Each outcome differs in terms of one or more metrics. There are ten such outcome screens. Fill in the radio button underneath the outcome you prefer and click the submit button to proceed to the next screen.

When you have made your choices for all ten decision outcomes, the instrument automatically forwards to the exit interview screen.

8. Screen Shot: Exit Interview

We want to know how well you understood what you were doing while completing the survey instrument. We also want your opinion on this process. Please let us know how well we did.

When finished, click submit.

9. Screen Shot: Exit Screen

Thank you for your participation in this stakeholder assessment. Please wait for the administrator to initiate a new session and Click Here to continue and start another planning unit or Click Here to log out.

Slide: How will we use this Information?

The information about your preferences that we gather today will be used to identify what alternatives lead to the most desirable outcomes given those preferences.

Attachment 3 – Stakeholder Initial Survey Results

Louisiana Coastal Protection and Restoration (LACPR) Final Technical Report
MCDA Attachment 3 – Stakeholder Initial Survey Results

Participants were asked a series of eight questions in the initial survey. The purpose of the initial survey was to generate additional information that may explain observed stakeholder preference patterns. For example, when asked if their organization has changed significantly as a direct result of hurricanes Katrina and Rita, most respondents (108 of 154) agreed or strongly agreed. When asked if they believe that wetlands alone, in sufficient quantities, would provide a buffer against future storm surge, 95 of 154 participants disagreed or strongly disagreed. One hundred thirteen of 154 respondents indicated that they disagreed or strongly disagreed with the statement that sea level rise will have a meaningful impact on the economy of the Louisiana coast over the next fifty years. When asked whether there is an adequate hurricane risk reduction system that provides direct benefits to the area where their organization's interests are located, 121 of 154 participants disagreed or strongly disagreed.

Responses to Entry Survey Question 1						
My organization has changed significantly as a direct result of Hurricanes Katrina and/or Rita.	Planning Unit					Total
	1	2	3a	3b	4	
Strongly disagree	0	0	2	1	4	7
Disagree	3	3	6	6	7	25
No opinion	4	3	3	1	3	14
Agree	20	14	14	11	8	67
Strongly agree	18	7	5	6	5	41
Total responses	45	27	30	25	27	154

Responses to Entry Survey Question 2						
My organization believes that wetlands alone, in sufficient quantity, would provide a buffer against future storm surge	Planning Unit					Total
	1	2	3a	3b	4	
Strongly disagree	8	3	4	6	4	25
Disagree	19	14	16	11	10	70
No opinion	2	1	1	1	4	9
Agree	13	4	7	3	5	32
Strongly agree	3	5	2	4	4	18
Total responses	45	27	30	25	27	154

Responses to Entry Survey Question 3						
My organization believes that it is unlikely that sea-level rise will have any meaningful impact on the economy of the Louisiana coastal area over the next fifty years.	Planning Unit					Total
	1	2	3a	3b	4	
Strongly disagree	14	9	10	10	3	46
Disagree	23	9	16	5	14	67
No opinion	3	4	3	5	6	21
Agree	2	0	1	2	0	5
Strongly agree	3	5	0	3	4	15
Total responses	45	27	30	25	27	154

Responses to Entry Survey Question 4						
Since Hurricanes Katrina and Rita, my organization has invested a lot of money to reduce the impact of natural disasters that may occur in the future.	Planning Unit					Total
	1	2	3a	3b	4	
Strongly disagree	1	1	1	1	1	5
Disagree	8	2	3	4	4	21
No opinion	7	4	7	7	6	31
Agree	17	13	11	11	10	62
Strongly agree	12	7	8	2	6	35
Total responses	45	27	30	25	27	154

Responses to Entry Survey Question 5						
There is an adequate hurricane risk reduction system that provides direct benefits to the area where my organization's interests are located.	Planning Unit					Total
	1	2	3a	3b	4	
Strongly disagree	20	9	14	11	10	64
Disagree	15	12	9	10	11	57
No opinion	4	1	1	2	2	10
Agree	4	3	6	2	3	18
Strongly agree	2	2	0	0	1	5
Total responses	45	27	30	25	27	154

Responses to Entry Survey Question 6						
My organization believes that it may be more important to preserve significant archeological and historical heritage sites in Louisiana than it is to provide hurricane risk reduction to some of the more remote communities along the coast.	Planning Unit					Total
	1	2	3a	3b	4	
Strongly disagree	9	5	6	6	5	31
Disagree	18	10	15	13	9	65
No opinion	13	9	6	6	10	44
Agree	5	3	1	0	2	11
Strongly agree	0	0	2	0	1	3
Total responses	45	27	30	25	27	154

Responses to Entry Survey Question 7						
My organization is deeply concerned about the effects that climate change may have on future generations.	Planning Unit					Total
	1	2	3a	3b	4	
Strongly disagree	6	1	2	2	1	12
Disagree	6	2	3	5	2	18
No opinion	8	6	7	6	8	35
Agree	15	10	14	4	11	54
Strongly agree	10	8	4	8	5	35
Total responses	45	27	30	25	27	154

Responses to Entry Survey Question 8						
For the questions above, my own personal views align closely with those of my organization.	Planning Unit					Total
	1	2	3a	3b	4	
Strongly disagree	1	0	1	1	0	3
Disagree	2	0	1	1	2	6
No opinion	2	2	5	3	5	17
Agree	23	19	19	12	15	88
Strongly agree	17	6	4	8	5	40
Total responses	45	27	30	25	27	154

Attachment 4 – Stakeholder Exit Survey Results

Louisiana Coastal Protection and Restoration (LACPR) Final Technical Report
MCDA Attachment 4 – Stakeholder Exit Survey Results

Participants answered a series of questions to complete the survey instrument. The purpose of the exit survey was to expose the respondents to a series of questions that would identify their level of understanding of what they had done, the instrument's ease of use, and future improvements they would like to see made to the weight elicitation process. While completing the exit survey, the preponderance of the participants indicated they understood what they had done. When asked how well they understood the metrics, performance outcomes and tradeoffs, the majority of participants indicated they knew about the same or knew more than before. Ninety-six of 154 participants admitted to having questions about the willingness-to-tradeoff amount, but most agreed that having the information that was provided to them on the amount helped them refine their ratings. When asked questions related to the amount of preparatory materials and instructions provided and the amount of time allotted to complete the survey, most participants indicated that these amounts were about right (60% to 91%). Lastly, 104 of 154 respondents (68%) stated that they would recommend this survey technique for similar evaluations. The level of understanding exhibited by the participants suggests that the preference values they provided are valid.

Response	*Number of Respondents*	How well do you feel you understand the metrics and performance outcomes for the hurricane risk reduction alternatives now that you have completed the survey?
1	5	*Less than before taking the survey*
2	65	*About the same as before taking the survey*
3	84	*More than before taking the survey*

Response	*Number of Respondents*	How well do you feel that you understand the tradeoffs that are involved in choosing a hurricane risk reduction alternative?
1	15	*Less than before taking the survey*
2	68	*About the same as before taking the survey*
3	71	*More than before taking the survey*

Response	*Number of Respondents*	How well do you feel that you understand what the maximum willingness-to-tradeoff amount represents?
1	10	*Not at all*
2	96	*I have some questions about what this amount represents*
3	48	*I have a full understanding of what this amount represents*

Response	*Number of Respondents*	Do you feel that having information on the maximum willingness-to-tradeoff amount for each improvement helped you refine your rating scale?
1	3	*Disagree strongly*
2	13	*Disagree*
3	38	*No opinion*
4	83	*Agree*
5	17	*Agree strongly*

Response	*Number of Respondents*	The amount of information that I received about the LACPR project in preparation for participating in this survey was:
1	56	*Too little*
2	93	*About right*
3	5	*Too much*

Response	*Number of Respondents*	The instructions that I received regarding how to use the survey instrument were:
1	12	*Too little*
2	136	*About right*
3	6	*Too much*

Response	*Number of Respondents*	The amount of time provided to complete the survey was:
1	12	*Too little*
2	140	*About right*
3	2	*Too much*

Response	*Number of Respondents*	Would you recommend this survey technique be used for similar evaluations?
1	104	*Yes (100)*
2	50	*No (0)*

Response	*Number of Respondents*	How would you prefer to receive information regarding the LACPR swing-weight exercise?
1	117	*Send me an email*
2	17	*Post updates to the LACPR web page*
3	1	*Teleconference*
4	17	*Other*
5	2	*In- person meetings*

Response	*Number of Respondents*	If the same survey were given to 100 people, what percentage do you believe would agree with you on the ranking of your top-ranked improvement (metric)?
0	0	*0%*
1	1	*10%*
2	10	*20%*
3	12	*30%*
4	9	*40%*
5	21	*50%*
6	12	*60%*
7	25	*70%*
8	33	*80%*
9	25	*90%*
10	6	*100%*

Response	*Number of Respondents*	If the same survey were given to 100 people, what percentage would agree with you on the ranking of your lowest-ranked improvement (metric)?
0	0	*0%*
1	3	*10%*
2	8	*20%*
3	10	*30%*
4	9	*40%*
5	17	*50%*
6	13	*60%*
7	37	*70%*
8	28	*80%*
9	24	*90%*
10	5	*100%*

Attachment 5. Swing Weights for Stakeholders Participating in LACPR Workshops, July 2008.

Respondent	PU	SESSION	SWT_POP	SWT_DAM	SWT_COST	SWT_TIME	SWT_EMP	SWT_IEI	SWT_DWI	SWT_HPRO	SWT_HDIS	SWT_ASIT
1	1	New Orleans 073008 AM	0.13120	0.10204	0.29155	0.14577	0.07289	0.18950	0.05831	0.00292	0.00292	0.00292
2	1	New Orleans 073008 AM	0.17857	0.17857	0.05357	0.08929	0.08929	0.08929	0.17857	0.03571	0.07143	0.03571
3	1	New Orleans 073008 AM	0.18095	0.19048	0.01905	0.05714	0.17143	0.09524	0.15238	0.03810	0.05714	0.03810
4	1	Houma 080109 PM	0.19417	0.19417	0.09709	0.09709	0.17476	0.02913	0.02913	0.01942	0.14563	0.01942
5	1	Lake Charles 0729 PM	0.05435	0.10870	0.17391	0.17391	0.10870	0.16304	0.21739	0.00000	0.00000	0.00000
6	1	New Orleans 073008 AM	0.15652	0.13043	0.16522	0.12174	0.12174	0.01739	0.17391	0.03478	0.03478	0.04348
7	1	New Orleans 073008 AM	0.11215	0.11215	0.14953	0.14953	0.09346	0.05607	0.18692	0.04673	0.04673	0.04673
8	1	New Orleans 073008 AM	0.14286	0.07937	0.12698	0.12698	0.07937	0.09524	0.15873	0.06349	0.06349	0.06349
9	1	New Orleans 073008 PM	0.10118	0.16863	0.01349	0.13491	0.10118	0.09275	0.16863	0.13491	0.05059	0.03373
10	1	New Orleans 073008 PM	0.12500	0.08333	0.08333	0.06944	0.06944	0.13889	0.13889	0.11111	0.11111	0.06944
11	1	New Orleans 073008 PM	0.13793	0.09483	0.05172	0.03448	0.08621	0.15517	0.17241	0.09483	0.10345	0.06897
12	1	Abbeville 72808 PM	0.11465	0.11465	0.11210	0.08917	0.07643	0.12102	0.12739	0.08280	0.08790	0.07389
13	1	New Orleans 073008 AM	0.08000	0.08000	0.16000	0.16000	0.16000	0.08000	0.14400	0.04800	0.04800	0.04000
14	1	New Orleans 073008 AM	0.14706	0.14706	0.07843	0.07843	0.19608	0.07843	0.14706	0.02941	0.04902	0.04902
15	1	New Orleans 073008 PM	0.09639	0.12048	0.08434	0.09639	0.12048	0.09639	0.12048	0.24096	0.01205	0.01205
16	1	Lake Charles 0729 PM	0.16667	0.17544	0.13158	0.13158	0.07018	0.17544	0.08772	0.00877	0.04386	0.00877
17	1	New Orleans 073008 AM	0.11644	0.10274	0.06849	0.11644	0.11644	0.13699	0.13699	0.06849	0.06849	0.06849
18	1	New Orleans 073008 AM	0.12500	0.16071	0.05357	0.16071	0.12500	0.17857	0.07143	0.03571	0.07143	0.01786
19	1	New Orleans 073008 AM	0.11905	0.10317	0.10317	0.10317	0.11905	0.15873	0.15873	0.04762	0.03968	0.04762
20	1	New Orleans 073008 PM	0.12925	0.12925	0.09524	0.08844	0.09524	0.13605	0.12245	0.08163	0.09524	0.02721
21	1	New Orleans 073008 PM	0.13433	0.08955	0.11940	0.07463	0.05970	0.14925	0.13433	0.05970	0.05970	0.11940
22	1	New Orleans 073008 PM	0.12613	0.09009	0.12613	0.08108	0.09009	0.18018	0.18018	0.03604	0.03604	0.05405
23	1	Houma 080109 PM	0.12752	0.11409	0.12752	0.12081	0.12081	0.13423	0.13423	0.04027	0.04027	0.04027
24	1	New Orleans 073008 AM	0.13333	0.06667	0.13333	0.12000	0.10667	0.09333	0.13333	0.06667	0.09333	0.05333
25	1	New Orleans 073008 AM	0.15385	0.15385	0.07692	0.11538	0.15385	0.07692	0.07692	0.07692	0.07692	0.03846
26	1	New Orleans 073008 AM	0.15504	0.07752	0.07752	0.09302	0.14729	0.01550	0.03101	0.13953	0.13953	0.12403
27	1	New Orleans 073008 AM	0.13793	0.13793	0.10345	0.03448	0.10345	0.03448	0.13793	0.10345	0.10345	0.10345
28	1	New Orleans 073008 AM	0.18519	0.14815	0.00000	0.03704	0.05556	0.12963	0.16667	0.09259	0.11111	0.07407
29	1	New Orleans 073008 AM	0.14184	0.12057	0.09929	0.07092	0.11348	0.11348	0.12766	0.07092	0.07092	0.07092
30	1	New Orleans 073008 AM	0.15748	0.10236	0.11811	0.07874	0.10236	0.11811	0.14961	0.04724	0.07874	0.04724
31	1	New Orleans 073008 AM	0.14881	0.11161	0.06696	0.09970	0.14881	0.14881	0.11161	0.02976	0.06696	0.06696
32	1	New Orleans 073008 AM	0.16863	0.14334	0.11804	0.08432	0.10118	0.14334	0.15177	0.01686	0.05565	0.01686
33	1	New Orleans 073008 AM	0.30864	0.24691	0.15432	0.15432	0.08642	0.01543	0.01543	0.00617	0.00617	0.00617
34	1	New Orleans 073008 AM	0.15361	0.11521	0.10292	0.10292	0.11521	0.10292	0.11521	0.07680	0.03840	0.07680
35	1	New Orleans 073008 AM	0.21505	0.16129	0.10753	0.10753	0.12903	0.06452	0.07527	0.05376	0.05376	0.03226
36	1	New Orleans 073008 AM	0.11682	0.11682	0.11682	0.09229	0.11682	0.09346	0.09229	0.08178	0.08762	0.08528
37	1	New Orleans 073008 AM	0.18868	0.13208	0.03774	0.11321	0.05660	0.11321	0.16981	0.07547	0.05660	0.05660
38	1	New Orleans 073008 AM	0.14184	0.12057	0.10638	0.07092	0.11348	0.09929	0.11348	0.09220	0.08511	0.05674
39	1	New Orleans 073008 AM	0.18182	0.09091	0.12727	0.14545	0.16364	0.07273	0.10909	0.05455	0.03636	0.01818
40	1	New Orleans 073008 PM	0.18692	0.17757	0.14953	0.15888	0.16822	0.14019	0.00748	0.00561	0.00187	0.00374
41	1	New Orleans 073008 PM	0.31746	0.15873	0.12698	0.12698	0.25397	0.00317	0.00317	0.00317	0.00317	0.00317
42	1	New Orleans 073008 PM	0.22472	0.20225	0.05618	0.08989	0.17978	0.08989	0.08989	0.02247	0.03371	0.01124
43	1	Houma 080108 AM	0.18692	0.14953	0.14019	0.10280	0.09346	0.17757	0.10280	0.00935	0.02804	0.00935
44	1	Abbeville 72808 PM	0.16000	0.12800	0.09600	0.16000	0.09600	0.16000	0.16000	0.01600	0.01600	0.00800
45	1	New Orleans 073008 PM	0.17738	0.07761	0.11086	0.22173	0.07761	0.17738	0.11086	0.02217	0.02217	0.00222
46	2	Lake Charles 072908 AM	0.12500	0.10000	0.25000	0.17500	0.08750	0.16250	0.06250	0.01250	0.01250	0.01250
47	2	Lake Charles 0729 PM	0.16505	0.19417	0.17476	0.03883	0.11650	0.18447	0.09709	0.00971	0.00971	0.00971

48	2	Houma 080108 AM	0.14599	0.14599	0.07299	0.12409	0.13139	0.14599	0.12409	0.03650	0.03650	0.03650
49	2	New Orleans 073008 AM	0.07463	0.11194	0.11940	0.14925	0.11194	0.14925	0.14925	0.04478	0.04478	0.04478
50	2	New Orleans 073008 AM	0.11475	0.09836	0.09836	0.14754	0.08197	0.09836	0.16393	0.06557	0.06557	0.06557
51	2	New Orleans 073008 PM	0.12613	0.09009	0.12613	0.08108	0.09009	0.18018	0.18018	0.03604	0.03604	0.05405
52	2	Abbeville 72808 PM	0.09677	0.11613	0.10968	0.10323	0.09032	0.12258	0.12903	0.07742	0.08387	0.07097
53	2	New Orleans 073008 AM	0.14706	0.14706	0.07843	0.07843	0.19608	0.07843	0.14706	0.02941	0.04902	0.04902
54	2	Houma 080108 AM	0.18605	0.10571	0.08457	0.13742	0.21142	0.19027	0.05285	0.01057	0.01057	0.01057
55	2	New Orleans 073008 AM	0.15517	0.15517	0.05172	0.15517	0.12069	0.17241	0.06897	0.03448	0.06897	0.01724
56	2	New Orleans 073008 PM	0.14063	0.04688	0.14063	0.02344	0.08594	0.15625	0.09375	0.09375	0.10938	0.10938
57	2	New Orleans 073008 AM	0.13333	0.09333	0.13333	0.09333	0.12000	0.12000	0.13333	0.05333	0.06667	0.05333
58	2	New Orleans 073008 AM	0.15504	0.07752	0.07752	0.09302	0.14729	0.01550	0.03101	0.13953	0.13953	0.12403
59	2	New Orleans 073008 AM	0.17857	0.10714	0.03571	0.12500	0.05357	0.12500	0.16071	0.07143	0.07143	0.07143
60	2	New Orleans 073008 AM	0.14184	0.12057	0.10638	0.07092	0.11348	0.09220	0.11348	0.09929	0.08511	0.05674
61	2	New Orleans 073008 AM	0.18182	0.09091	0.12727	0.14545	0.16364	0.07273	0.10909	0.05455	0.03636	0.01818
62	2	New Orleans 073008 PM	0.19608	0.17647	0.12745	0.15686	0.13725	0.11765	0.05882	0.01373	0.00588	0.00980
63	2	New Orleans 073008 PM	0.21739	0.18478	0.04348	0.16304	0.19565	0.00000	0.19565	0.00000	0.00000	0.00000
64	2	New Orleans 073008 PM	0.23529	0.17647	0.16471	0.18824	0.11765	0.02353	0.02353	0.02353	0.02353	0.02353
65	2	New Orleans 073008 PM	0.16667	0.13333	0.12500	0.11667	0.13333	0.08333	0.10833	0.05000	0.05000	0.03333
66	2	New Orleans 073008 PM	0.31250	0.15625	0.07813	0.15625	0.07813	0.06250	0.06250	0.03125	0.03125	0.03125
67	2	New Orleans 073008 PM	0.11628	0.11628	0.11047	0.11628	0.11628	0.11047	0.11047	0.07558	0.07558	0.05233
68	2	Houma 080108 AM	0.14388	0.12950	0.12950	0.14388	0.12950	0.10791	0.12950	0.02878	0.03597	0.02158
69	2	Houma 080108 AM	0.17241	0.06897	0.13793	0.13793	0.08621	0.06897	0.13793	0.06897	0.05172	0.06897
70	2	Houma 080108 AM	0.19231	0.15385	0.13462	0.08654	0.10577	0.18269	0.10577	0.00962	0.01923	0.00962
71	2	Abbeville 72808 PM	0.15873	0.11111	0.07937	0.14286	0.11111	0.15873	0.15873	0.01587	0.04762	0.01587
72	2	Houma 080108 AM	0.12258	0.10968	0.09032	0.12903	0.11613	0.09677	0.10323	0.07742	0.08387	0.07097
73	3a	Houma 080108 AM	0.17045	0.22727	0.11364	0.14773	0.14773	0.10227	0.05682	0.01136	0.01136	0.01136
74	3a	Houma 080108 AM	0.12860	0.19194	0.09597	0.06334	0.14395	0.15355	0.19194	0.00000	0.00000	0.03071
75	3a	New Orleans 073008 PM	0.12613	0.09009	0.12613	0.08108	0.09009	0.18018	0.18018	0.03604	0.03604	0.05405
76	3a	Houma 080109 PM	0.02597	0.20779	0.15584	0.02597	0.05195	0.23377	0.25974	0.01299	0.01299	0.01299
77	3a	Abbeville 72808 PM	0.08796	0.12179	0.11908	0.09472	0.08796	0.12991	0.13532	0.06766	0.07442	0.08119
78	3a	Lake Charles 0729 PM	0.17143	0.19048	0.17143	0.03810	0.11429	0.19048	0.09524	0.00952	0.00952	0.00952
79	3a	Houma 080108 AM	0.17476	0.09709	0.09709	0.14563	0.17476	0.19417	0.08738	0.00971	0.00971	0.00971
80	3a	Houma 080108 AM	0.12195	0.12195	0.09756	0.12195	0.09756	0.24390	0.12195	0.02439	0.02439	0.02439
81	3a	Houma 080109 PM	0.08929	0.08929	0.26786	0.03571	0.03571	0.35714	0.08929	0.00000	0.03571	0.00000
82	3a	Houma 080109 PM	0.02049	0.10246	0.32787	0.10246	0.02049	0.40984	0.00410	0.00410	0.00410	0.00410
83	3a	New Orleans 073008 AM	0.17544	0.14035	0.03509	0.12281	0.05263	0.12281	0.15789	0.07018	0.05263	0.07018
84	3a	New Orleans 073008 AM	0.18182	0.09091	0.12727	0.14545	0.16364	0.07273	0.10909	0.05455	0.03636	0.01818
85	3a	New Orleans 073008 PM	0.23529	0.11765	0.11765	0.14118	0.17647	0.00000	0.21176	0.00000	0.00000	0.00000
86	3a	Houma 080108 AM	0.14388	0.12950	0.12950	0.14388	0.12950	0.10791	0.12950	0.02878	0.03597	0.02158
87	3a	Houma 080108 AM	0.18018	0.18018	0.18018	0.14414	0.14414	0.05405	0.09009	0.00901	0.00901	0.00901
88	3a	Houma 080108 AM	0.15873	0.08730	0.11111	0.10317	0.09524	0.08730	0.11905	0.07937	0.07937	0.07937
89	3a	Houma 080108 AM	0.16529	0.13223	0.11570	0.09091	0.12397	0.14050	0.08264	0.04959	0.04959	0.04959
90	3a	Houma 080108 AM	0.20619	0.16495	0.11340	0.13402	0.05155	0.19588	0.10309	0.01031	0.01031	0.01031
91	3a	Houma 080108 AM	0.14493	0.14493	0.09420	0.09420	0.14493	0.10870	0.09420	0.05797	0.05797	0.05797
92	3a	Houma 080108 AM	0.11905	0.10119	0.10119	0.10119	0.11905	0.10119	0.10119	0.08333	0.08929	0.08333
93	3a	Houma 080108 AM	0.14706	0.08824	0.11765	0.14706	0.14706	0.11765	0.14706	0.02941	0.04412	0.01471
94	3a	Houma 080108 AM	0.14815	0.14815	0.10370	0.11852	0.08889	0.13333	0.14815	0.03704	0.03704	0.03704
95	3a	Houma 080108 AM	0.14815	0.14815	0.13333	0.14815	0.13333	0.11111	0.13333	0.01481	0.02222	0.00741
96	3a	Houma 080109 PM	0.18018	0.16216	0.12613	0.13514	0.14414	0.04505	0.05405	0.02703	0.09009	0.03604
97	3a	Houma 080109 PM	0.25000	0.18750	0.06250	0.05000	0.22500	0.02500	0.12500	0.02500	0.01250	0.03750
98	3a	Houma 080109 PM	0.25000	0.22500	0.02500	0.12500	0.17500	0.02500	0.02500	0.05000	0.05000	0.05000

99	3a	Houma 080109 PM	0.16000	0.16000	0.04000	0.14400	0.16000	0.04800	0.04800	0.08000	0.06400	0.09600
100	3a	Houma 080108 AM	0.12258	0.09032	0.10323	0.12903	0.11613	0.09677	0.10968	0.07742	0.08387	0.07097
101	3a	Houma 080109 PM	0.16129	0.10753	0.02151	0.21505	0.16129	0.10753	0.16129	0.02151	0.02151	0.02151
102	3a	Houma 080109 PM	0.13274	0.13274	0.06195	0.17699	0.08850	0.17699	0.17699	0.00885	0.02655	0.01770
103	3b	Abbeville 72808 PM	0.12500	0.12500	0.12500	0.11250	0.11250	0.10000	0.11250	0.06250	0.06250	0.06250
104	3b	Houma 080108 AM	0.13245	0.13245	0.09934	0.09934	0.09934	0.11921	0.11921	0.06623	0.06623	0.06623
105	3b	Abbeville 72808 AM	0.10054	0.13405	0.06702	0.10054	0.11394	0.10054	0.11394	0.08981	0.08981	0.08981
106	3b	Abbeville 72808 AM	0.12000	0.16000	0.04000	0.12000	0.12000	0.08000	0.16000	0.08000	0.08000	0.04000
107	3b	New Orleans 073008 PM	0.12613	0.09009	0.12613	0.08108	0.09009	0.18018	0.18018	0.03604	0.03604	0.05405
108	3b	Abbeville 72808 AM	0.13333	0.03704	0.11852	0.10370	0.09630	0.13333	0.14815	0.06667	0.11111	0.05185
109	3b	Abbeville 72808 AM	0.15238	0.13333	0.05714	0.09524	0.09524	0.15238	0.19048	0.03810	0.04762	0.03810
110	3b	Abbeville 72808 PM	0.10038	0.11292	0.11041	0.10665	0.08783	0.12045	0.12547	0.07779	0.08281	0.07528
111	3b	Abbeville 72808 AM	0.12295	0.14754	0.14754	0.08197	0.16393	0.08197	0.13934	0.03279	0.03279	0.04918
112	3b	Abbeville 72808 AM	0.11733	0.11600	0.10000	0.12000	0.13333	0.09867	0.11867	0.06400	0.06667	0.06533
113	3b	Houma 080109 PM	0.12000	0.09333	0.08000	0.09333	0.10667	0.06667	0.08000	0.13333	0.13333	0.09333
114	3b	Lake Charles 0729 PM	0.12422	0.20704	0.18634	0.04141	0.10352	0.20704	0.12422	0.00207	0.00207	0.00207
115	3b	Abbeville 72808 AM	0.05769	0.09615	0.07692	0.07692	0.05769	0.19231	0.07692	0.14423	0.14423	0.07692
116	3b	New Orleans 073008 AM	0.18182	0.09091	0.12727	0.14545	0.16364	0.07273	0.10909	0.05455	0.03636	0.01818
117	3b	Houma 080108 AM	0.14706	0.08824	0.11765	0.14706	0.14706	0.11765	0.14706	0.02941	0.04412	0.01471
118	3b	Houma 080108 AM	0.13889	0.11111	0.11111	0.13889	0.11111	0.06944	0.11111	0.06944	0.06944	0.06944
119	3b	Abbeville 72808 AM	0.20408	0.18367	0.06122	0.06122	0.16327	0.04082	0.08163	0.08163	0.10204	0.02041
120	3b	Abbeville 72808 AM	0.13123	0.11549	0.12073	0.12205	0.11680	0.11811	0.12467	0.04068	0.06824	0.04199
121	3b	Abbeville 72808 AM	0.18349	0.13761	0.16514	0.07339	0.11009	0.11009	0.13761	0.02752	0.03670	0.01835
122	3b	Abbeville 72808 AM	0.19763	0.17787	0.09881	0.09881	0.08522	0.06522	0.14822	0.04941	0.04941	0.04941
123	3b	Abbeville 72808 PM	0.18349	0.09174	0.11009	0.12844	0.09174	0.18349	0.18349	0.00917	0.00917	0.00917
124	3b	Abbeville 72808 AM	0.15000	0.15000	0.11667	0.16667	0.10000	0.10833	0.16667	0.01667	0.01667	0.00833
125	3b	Abbeville 72808 AM	0.08235	0.15294	0.15294	0.23529	0.11765	0.00706	0.21176	0.02353	0.01176	0.00471
126	3b	Abbeville 72808 AM	0.02128	0.08511	0.06383	0.42553	0.12766	0.02128	0.17021	0.02128	0.04255	0.02128
127	3b	Abbeville 72808 PM	0.11927	0.06422	0.13761	0.18349	0.09174	0.15596	0.16514	0.02752	0.02752	0.02752
128	4	Lake Charles 072908 AM	0.12162	0.09459	0.27027	0.13514	0.06757	0.17568	0.05405	0.04054		0.04054
129	4	Lake Charles 072908 AM	0.14286	0.14286	0.12857	0.12857	0.10000	0.05714	0.10000	0.10000		0.10000
130	4	Lake Charles 0729 PM	0.05357	0.17857	0.05357	0.17857	0.17857	0.17857	0.17857	0.00000		0.00000
131	4	Abbeville 72808 AM	0.16667	0.18519	0.07407	0.08333	0.14815	0.07407	0.08333	0.09259		0.09259
132	4	Abbeville 72808 PM	0.08000	0.20000	0.05000	0.13000	0.19000	0.10000	0.14000	0.09000		0.02000
133	4	Lake Charles 072908 AM	0.15094	0.05660	0.16981	0.05660	0.15094	0.11321	0.18868	0.05660		0.05660
134	4	Lake Charles 0729 PM	0.10309	0.10309	0.05155	0.15464	0.15464	0.16237	0.25773	0.00000		0.01289
135	4	Lake Charles 0729 PM	0.11494	0.06897	0.17241	0.18391	0.11494	0.11494	0.22989	0.00000		0.00000
136	4	Lake Charles 0729 PM	0.02784	0.20882	0.17169	0.00000	0.18561	0.17401	0.23202	0.00000		0.00000
137	4	New Orleans 073008 PM	0.13834	0.09881	0.13834	0.08893	0.09881	0.19763	0.19763	0.00198		0.03953
138	4	Abbeville 72808 PM	0.10430	0.12386	0.11734	0.11082	0.09909	0.12647	0.13038	0.09648		0.09126
139	4	Lake Charles 0729 PM	0.20000	0.20000	0.02222	0.02222	0.22222	0.16667	0.16667	0.00000		0.00000
140	4	Lake Charles 072908 AM	0.15842	0.14851	0.12871	0.09901	0.09901	0.19802	0.13861	0.01980		0.00990
141	4	Lake Charles 072908 AM	0.14050	0.15702	0.12397	0.08264	0.11570	0.16529	0.15702	0.01653		0.04132
142	4	Lake Charles 0729 PM	0.00000	0.00000	0.00000	0.00000	0.00000	0.50000	0.50000	0.00000		0.00000
143	4	Lake Charles 0729 PM	0.10000	0.10000	0.15000	0.15000	0.10000	0.20000	0.20000	0.00000		0.00000
144	4	Lake Charles 072908 AM	0.16667	0.12500	0.10833	0.12500	0.13333	0.12500	0.01667	0.08333		0.11667
145	4	Lake Charles 072908 AM	0.24390	0.19512	0.07317	0.17073	0.14634	0.12195	0.00000	0.02439		0.02439
146	4	Lake Charles 072908 AM	0.14599	0.12409	0.12409	0.13869	0.12409	0.13139	0.13869	0.03650		0.03650
147	4	Lake Charles 072908 AM	0.22222	0.07778	0.08889	0.18889	0.08889	0.11111	0.16667	0.02222		0.03333
148	4	Lake Charles 0729 PM	0.14925	0.11940	0.10448	0.10448	0.10448	0.11940	0.11940	0.08955		0.08955
149	4	New Orleans 073008 AM	0.18519	0.09259	0.11111	0.14815	0.16667	0.07407	0.12963	0.05556		0.03704

150	4	New Orleans 073008 PM	0.22222	0.20000	0.16667	0.16667	0.20000	0.00000	0.04444	0.00000	0.00000
151	4	Abbeville 72808 AM	0.64935	0.06494	0.03247	0.06494	0.16234	0.00649	0.00649	0.00649	0.00649
152	4	Abbeville 72808 AM	0.19231	0.17308	0.09615	0.09615	0.05769	0.15385	0.17308	0.02885	0.02885
153	4	Abbeville 72808 PM	0.15408	0.12327	0.10786	0.11402	0.11556	0.10015	0.13867	0.07704	0.06934
154	4	Abbeville 72808 AM	0.08178	0.15187	0.15187	0.23364	0.11682	0.00701	0.21028	0.03505	0.01168

Attachment B – Decision Support Documentation

(Evaluation Data and Plan Rankings to Support Risk Informed Decision Analysis)

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Introduction

The purpose of this attachment is to present a summary of other miscellaneous Decision Support Documentation considerations, in addition to the Multi-Criteria Decision Analysis (MCDA), that were used to support the LACPR Risk-Informed Decision Framework (RIDF). This additional documentation is provided in a series of sample evaluation data tables and plan rankings across the future without project condition scenarios, as described else where in the LACPR report. These data and rankings, along with the MCDA analysis, were used to develop the Indexed Scoring Tables presented in the LACPR main report, to facilitate identification of the final array of alternatives, and to provide input to the detailed tradeoff analysis of plan performance and outputs of these alternatives.

Relying primarily on the outputs of the MCDA analysis, as conducted to date, and the resulting initial indications of stakeholder preferences on alternatives, it became readily apparent that the MCDA process may be eliminating plans from further consideration that address a wider range of decision objectives important to decision makers and, in general, to a broader range of taxpayers nationwide.

Although the applied MCDA process provides insights to local and regional stakeholder preferences, the resulting ranking of plans for LACPR seemed to minimize the importance of alternatives that provide for a ***greater level of risk reduction*** and ***cost efficiency***. To assure that such plans were not prematurely eliminated from further consideration in the final array of alternatives, an evaluation process was developed to look at various combinations of multiple evaluation criteria to address these broader, overall decision objectives. This process is detailed in the LACPR main report.

The multiple combinations of evaluation criteria included (1) stakeholder input on preferences; (2) direct and indirect environmental impacts; (3) cost efficiency; (4) effectiveness in reducing risk; as well as (5) project costs and the realities of future funding requirements for both Federal and non-Federal interests. Based on these data, a more enlightened risk-informed decision could be made among alternatives, considering specific identified tradeoffs in these performance categories.

Without further iterations and refinements of the MCDA stakeholder process (which have not been possible for the current LACPR planning effort because of time constraints and available funding resources), it is not known whether the continuation of this process would have resulted in convergence on a more refined set of alternatives that better addresses the broader range of decision objectives as discussed above.

The data tables and plan rankings presented in this attachment are provided to increase the basic understanding of the evaluation criteria used to refine the list of alternatives and to provide the supporting documentation for how these evaluation data were developed and the impact they have on plan rankings across scenarios.

Sample evaluation data tables and plan rankings presented herein are grouped by LACPR planning unit. Evaluation data are provided for Scenario 1 (low relative sea level rise, high

employment, and dispersed population) for the 90% confidence level (low uncertainty) for water surface elevations. Plan rankings across scenarios are shown to present the possible variations considering alternative futures which take into account sea level rise, changes in population and differing land use patterns. As can be seen from these rankings, there is not a significant change in the relative ranking of alternatives based on differing future conditions. In general, the same set of alternatives, regardless of which scenario is being examined, is represented in the top tier of alternatives for each criteria or evaluation data set.

Each planning unit presentation includes the following evaluation data and tables, presented in the order shown:

- Metric Data
  - Output values or scoring of metrics for each alternative for the 10 metrics used in the MCDA
  - Relative ranking of the performance of all alternatives within each individual metric
- MCDA Trend Analysis
  - Expansion of MCDA presentation as included in Attachment A, which just identifies the frequency of which alternatives were ranked in the top 5.
  - Plan ranking for each alternative for each respondent who provided input in the stakeholder swing weighting meetings
  - Total (cumulative) ranking score for each alternative for all respondents
  - Ordinal ranking of alternatives across scenarios based on the total ranking scores
- Evaluation Criteria
  - Values calculated for each evaluation criteria for each alternative
  - Ordinal ranking of alternatives based on evaluation criteria values

Tables presented for the following data sets include: (1) sample data and ranking and (2) ranking of alternatives across scenarios.

- Cost Efficiency
- Total System Costs
- Period of Analysis Cost Efficiency
- Residual Damages (Remaining Risk)
- Period of Analysis Risk Reduction
- Average % Risk Reduction of Total Damages for 100-year to 2000-year frequency events.

Planning Unit 1

Sample Data Rankings and Evaluation Criteria Tables

Planning Unit 1 - Metric Data Summary

(Scenario 1 - Low Relative Sea Level Rise, High Employment, Dispersed Population; Low Uncertainty)

Plan #	Alternative	Population Impacted	Residual Damages	Life Cycle Cost	Construction Time	Employment Impacted	Indirect Environmental Impact Score	Direct Wetland Impacts	Historic Properties Protected	Historic Districts Protected	Archeo. Sites Protected
		Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Years	Ann. Equiv. #	Unit-less Scale -8 to +8	Acres	# Properties	# Districts	# Sites
1	No Action	51,017	1,401	0	15	6,339	0	0	122	41	111
2	Coastal	45,113	1,106	543	15	4,983	0	0	126	43	221
3	NS-100	39,672	732	873	15	3,236	0	0	126	43	221
4	NS-400	38,517	463	1,761	15	1,760	0	0	126	43	221
5	NS-1000	33,107	384	2,535	15	1,370	0	0	126	43	221
6	HL-a-100-2	39,955	950	1,525	12	4,019	-2	4,200	132	43	282
7	HL-a-100-3	40,309	961	1,356	12	4,058	-1	3,600	126	43	275
8	HL-b-400-2	38,544	797	3,076	16	3,261	-2	6,000	148	50	284
9	HL-b-400-3	38,940	810	2,837	16	3,306	-2	5,500	140	48	277
10	LP-a-100-1	40,916	904	903	14	3,715	-8	1,000	127	43	265
11	LP-a-100-2	38,655	842	1,691	14	3,435	-8	4,100	134	43	301
12	LP-a-100-3	38,931	850	1,622	14	3,467	-8	3,700	127	43	294
13	LP-b-400-1	40,570	878	1,849	16	3,598	-8	4,200	131	48	267
14	LP-b-400-3	38,442	811	2,847	16	3,279	-8	7,500	141	48	296
15	LP-b-1000-1	40,423	874	2,247	16	3,561	-8	5,100	131	48	267
16	LP-b-1000-2	37,940	796	3,578	16	3,203	-8	9,100	156	48	303
17	C-HL-a-100-2	39,008	873	1,672	12	3,709	-2	4,200	132	43	282
18	C-HL-a-100-3	39,309	870	1,514	12	3,717	-1	3,600	126	43	275
19	C-HL-b-400-2	37,294	708	3,238	16	2,864	-2	6,000	148	50	284
20	C-HL-b-400-3	37,636	704	3,011	16	2,853	-2	5,500	140	48	277
21	C-LP-a-100-1	39,725	744	1,100	14	3,102	-8	1,000	127	43	265
22	C-LP-a-100-2	37,747	751	1,834	14	3,057	-8	4,100	134	43	301
23	C-LP-a-100-3	37,976	750	1,773	14	3,068	-8	3,700	127	43	294
24	C-LP-b-400-1	38,960	684	2,147	16	2,758	-8	4,200	131	48	267
25	C-LP-b-400-3	37,263	705	3,008	16	2,830	-8	7,500	141	48	296
26	C-LP-b-1000-1	38,446	667	2,579	16	2,618	-8	5,100	131	48	267
27	C-LP-b-1000-2	36,596	697	3,754	16	2,780	-8	9,100	156	48	303

Planning Unit 1 - Relative Ranking of Alternatives Based On Individual Metrics

Best Case Improvement to Worst Case Outcome

(Scenario 1 - Low Relative Sea Level Rise, High Employment, Dispersed Population; Low Uncertainty)

Rank	Population Impacted	Residual Damages	Life Cycle Cost	Construction Time	Employment Impacted	Indirect Environmental Impact Score	Direct Wetland Impacts	Historic Properties Protected	Historic Districts Protected	Archeo. Sites Protected
1	NS-1000	NS-1000	No Action	HL-a-100-3	NS-1000	No Action	No Action	LP-b-1000-2	HL-b-400-2	LP-b-1000-2
2	C-LP-b-1000-2	NS-400	Coastal	C-HL-a-100-3	NS-400	Coastal	Coastal	C-LP-b-1000-2	C-HL-b-400-2	C-LP-b-1000-2
3	C-LP-b-400-3	C-LP-b-1000-1	NS-100	HL-a-100-2	C-LP-b-1000-1	NS-100	NS-100	HL-b-400-2	LP-b-400-1	LP-a-100-2
4	C-HL-b-400-2	C-LP-b-400-1	LP-a-100-1	C-HL-a-100-2	C-LP-b-400-1	NS-400	NS-400	C-HL-b-400-2	C-LP-b-400-1	C-LP-a-100-2
5	C-HL-b-400-3	C-LP-b-1000-2	C-LP-a-100-1	LP-a-100-1	C-LP-b-1000-2	NS-1000	NS-1000	LP-b-400-3	LP-b-1000-1	LP-b-400-3
6	C-LP-a-100-2	C-HL-b-400-3	HL-a-100-3	C-LP-a-100-1	C-LP-b-400-3	HL-a-100-3	LP-a-100-1	C-LP-b-400-3	C-LP-b-1000-1	C-LP-b-400-3
7	LP-b-1000-2	C-LP-b-400-3	C-HL-a-100-3	LP-a-100-3	C-HL-b-400-3	C-HL-a-100-3	C-LP-a-100-1	HL-b-400-3	HL-b-400-3	LP-a-100-3
8	C-LP-a-100-3	C-HL-b-400-2	HL-a-100-2	LP-a-100-2	C-HL-b-400-2	HL-a-100-2	HL-a-100-3	C-HL-b-400-3	LP-b-400-3	C-LP-a-100-3
9	LP-b-400-3	NS-100	LP-a-100-3	C-LP-a-100-3	C-LP-a-100-2	C-HL-a-100-2	C-HL-a-100-3	LP-a-100-2	C-LP-b-400-3	HL-b-400-2
10	C-LP-b-1000-1	C-LP-a-100-1	C-HL-a-100-2	C-LP-a-100-2	C-LP-a-100-3	HL-b-400-3	LP-a-100-3	C-LP-a-100-2	C-HL-b-400-3	C-HL-b-400-2
11	NS-400	C-LP-a-100-3	LP-a-100-2	No Action	C-LP-a-100-1	C-HL-b-400-3	C-LP-a-100-3	HL-a-100-2	LP-b-1000-2	HL-a-100-2
12	HL-b-400-2	C-LP-a-100-2	NS-400	Coastal	LP-b-1000-2	HL-b-400-2	LP-a-100-2	C-HL-a-100-2	C-LP-b-1000-2	C-HL-a-100-2
13	LP-a-100-2	LP-b-1000-2	C-LP-a-100-3	NS-100	NS-100	C-HL-b-400-2	C-LP-a-100-2	LP-b-400-1	Coastal	HL-b-400-3
14	LP-a-100-3	HL-b-400-2	C-LP-a-100-2	NS-400	HL-b-400-2	LP-a-100-1	HL-a-100-2	C-LP-b-400-1	NS-100	C-HL-b-400-3
15	HL-b-400-3	HL-b-400-3	LP-b-400-1	NS-1000	LP-b-400-3	C-LP-a-100-1	C-HL-a-100-2	LP-b-1000-1	LP-a-100-1	HL-a-100-3
16	C-LP-b-400-1	LP-b-400-3	C-LP-b-400-1	LP-b-400-1	HL-b-400-3	LP-a-100-3	LP-b-400-1	C-LP-b-1000-1	C-LP-a-100-1	C-HL-a-100-3
17	C-HL-a-100-2	LP-a-100-2	LP-b-1000-1	C-LP-b-400-1	LP-a-100-2	LP-a-100-2	C-LP-b-400-1	LP-a-100-1	HL-a-100-3	LP-b-400-1
18	C-HL-a-100-3	LP-a-100-3	NS-1000	LP-b-1000-1	LP-a-100-3	C-LP-a-100-3	LP-b-1000-1	C-LP-a-100-1	C-HL-a-100-3	C-LP-b-400-1
19	NS-100	C-HL-a-100-3	C-LP-b-1000-1	C-LP-b-1000-1	LP-b-1000-1	C-LP-a-100-2	C-LP-b-1000-1	LP-a-100-3	HL-a-100-2	LP-b-1000-1
20	C-LP-a-100-1	C-HL-a-100-2	HL-b-400-3	HL-b-400-3	LP-b-400-1	LP-b-400-1	HL-b-400-3	C-LP-a-100-3	LP-a-100-3	C-LP-b-1000-1
21	HL-a-100-2	LP-b-1000-1	LP-b-400-3	LP-b-400-3	C-HL-a-100-2	C-LP-b-400-1	C-HL-b-400-3	Coastal	C-HL-a-100-2	LP-a-100-1
22	HL-a-100-3	LP-b-400-1	C-LP-b-400-3	C-LP-b-400-3	LP-a-100-1	LP-b-1000-1	HL-b-400-2	NS-100	LP-a-100-2	C-LP-a-100-1
23	LP-b-1000-1	LP-a-100-1	C-HL-b-400-3	C-HL-b-400-3	C-HL-a-100-3	C-LP-b-1000-1	C-HL-b-400-2	HL-a-100-3	NS-400	Coastal
24	LP-b-400-1	HL-a-100-2	HL-b-400-2	HL-b-400-2	HL-a-100-2	LP-b-400-3	LP-b-400-3	C-HL-a-100-3	C-LP-a-100-3	NS-100
25	LP-a-100-1	HL-a-100-3	C-HL-b-400-2	C-HL-b-400-2	HL-a-100-3	C-LP-b-400-3	C-LP-b-400-3	NS-400	C-LP-a-100-2	NS-400
26	Coastal	Coastal	LP-b-1000-2	LP-b-1000-2	Coastal	LP-b-1000-2	LP-b-1000-2	NS-1000	NS-1000	NS-1000
27	No Action	No Action	C-LP-b-1000-2	C-LP-b-1000-2	No Action	C-LP-b-1000-2	C-LP-b-1000-2	No Action	No Action	No Action

Planning Unit 1 - Multi-Criteria Decision Analysis (MCDA) Trend Analysis

(Scenario 1 - Low Relative Sea Level Rise, High Employment, Dispersed Population; Low Uncertainty)

Plan #	Alternative	Plan Rank By Each Respondant (Page 1 of 2)																									
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
1	No Action	11	9	20	17	18	27	27	27	16	19	21	20	9	19	22	9	13	19	9	27	20	22	27	19	26	22
2	Coastal	4	2	4	6	3	9	26	5	4	4	6	7	4	4	4	2	4	5	4	15	4	5	8	4	5	5
3	NS-100	1	1	1	1	1	3	19	2	1	3	3	3	1	2	3	1	1	3	2	2	3	2	3	1	1	3
4	NS-400	3	3	2	2	2	2	18	3	2	2	2	2	3	3	2	3	3	2	3	3	2	3	2	3	2	2
5	NS-1000	2	4	3	3	4	1	10	1	3	1	1	1	2	1	1	6	2	1	1	1	1	1	1	2	3	1
6	HL-a-100-2	8	8	8	10	8	7	8	10	10	8	11	8	8	8	9	7	8	8	8	8	8	8	7	8	8	8
7	HL-a-100-3	6	6	6	8	6	6	16	11	7	6	9	5	6	6	8	4	6	6	6	7	6	6	6	6	6	6
8	HL-b-400-2	13	19	12	22	16	10	2	12	20	10	5	10	12	10	15	16	12	10	15	22	13	11	14	12	10	10
9	HL-b-400-3	12	15	16	23	19	13	21	20	21	12	12	12	15	14	16	12	15	12	14	21	14	14	18	18	14	14
10	LP-a-100-1	15	11	10	5	10	15	22	6	8	14	14	14	14	13	10	10	10	14	11	11	10	12	11	10	12	13
11	LP-a-100-2	19	17	17	14	14	17	9	15	14	17	18	17	19	17	18	18	19	17	19	12	18	17	16	15	17	17
12	LP-a-100-3	18	13	18	13	13	18	20	16	13	18	19	18	18	18	17	14	18	18	18	13	17	18	17	16	18	18
13	LP-b-400-1	21	21	21	16	21	23	24	19	17	21	23	22	21	21	21	20	21	22	21	19	22	20	21	21	20	21
14	LP-b-400-3	25	25	25	25	25	25	12	25	25	26	27	26	25	25	25	24	25	25	25	24	25	26	25	25	25	26
15	LP-b-1000-1	23	23	23	21	23	26	25	23	23	23	26	25	23	23	23	22	23	23	23	23	23	23	23	23	23	23
16	LP-b-1000-2	27	27	27	27	27	24	4	26	27	27	25	27	27	27	27	26	27	27	27	26	27	27	26	27	27	27
17	C-HL-a-100-2	7	7	7	9	7	5	5	9	9	7	8	6	7	7	7	8	7	7	7	5	7	7	5	7	7	7
18	C-HL-a-100-3	5	5	5	7	5	4	11	8	6	5	7	4	5	5	5	5	5	4	5	4	5	4	4	5	4	4
19	C-HL-b-400-2	10	18	11	20	15	8	1	7	18	9	4	9	10	9	11	17	11	9	13	18	11	9	10	11	9	9
20	C-HL-b-400-3	9	14	13	19	17	12	14	18	19	11	10	11	13	12	12	13	14	11	12	17	12	13	15	17	13	12
21	C-LP-a-100-1	14	10	9	4	9	11	15	4	5	13	13	13	11	11	8	11	9	13	10	6	9	10	9	9	11	11
22	C-LP-a-100-2	17	16	14	12	12	14	6	13	12	15	15	15	17	15	14	19	17	15	17	10	16	15	12	13	15	15
23	C-LP-a-100-3	16	12	15	11	11	16	13	14	11	16	16	16	16	16	13	15	16	16	16	9	15	16	13	14	16	16
24	C-LP-b-400-1	20	20	19	15	20	19	17	17	15	20	17	19	20	20	19	21	20	20	20	14	19	19	19	20	19	19
25	C-LP-b-400-3	24	24	24	24	24	22	7	22	24	24	24	23	24	24	24	25	24	24	24	20	24	24	22	24	22	24
26	C-LP-b-1000-1	22	22	22	18	22	20	23	21	22	22	20	21	22	22	20	23	22	21	22	16	21	21	20	22	21	20
27	C-LP-b-1000-2	26	26	26	26	26	21	3	24	26	25	22	24	26	26	26	27	26	26	26	25	26	25	24	26	24	25

Planning Unit 1 - Multi-Criteria Decision Analysis (MCDA) Trend Analysis

(Scenario 1 - Low Relative Sea Level Rise, High Employment, Dispersed Population; Low Uncertainty)

Plan #	Alternative	Plan Rank By Each Respondant (Page 2 of 2)																			Total Ranking Score (All Respondants)
		27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	
1	No Action	20	22	23	20	15	15	24	27	15	27	9	13	26	16	9	14	27	12	18	847
2	Coastal	4	5	6	8	4	4	7	5	4	24	4	4	8	6	4	4	21	4	4	283
3	NS-100	2	3	2	2	2	1	2	3	2	3	1	3	3	2	1	1	3	2	1	106
4	NS-400	3	2	3	3	3	3	3	2	3	2	2	2	2	3	3	2	2	3	2	127
5	NS-1000	1	1	1	1	1	2	1	1	1	1	3	1	1	1	2	3	1	1	3	85
6	HL-a-100-2	8	9	8	7	8	8	8	9	9	10	8	10	7	8	8	8	9	8	8	373
7	HL-a-100-3	6	7	5	5	6	6	10	8	6	9	6	7	6	5	6	6	6	6	6	297
8	HL-b-400-2	10	12	17	13	10	10	5	10	10	25	14	8	12	13	14	13	13	15	10	567
9	HL-b-400-3	14	13	18	12	12	13	12	13	12	22	15	12	13	12	13	15	19	14	14	675
10	LP-a-100-1	13	14	10	14	14	14	14	14	14	11	11	15	14	14	15	10	15	10	13	554
11	LP-a-100-2	17	18	14	17	18	18	16	17	17	12	19	18	18	19	19	19	17	19	17	756
12	LP-a-100-3	18	19	15	18	19	19	20	18	19	13	18	20	19	18	18	18	18	18	19	779
13	LP-b-400-1	21	21	20	22	21	21	23	22	21	19	21	21	21	21	21	21	22	21	21	941
14	LP-b-400-3	26	26	25	25	26	25	25	26	27	21	25	26	25	25	25	25	25	25	25	1,119
15	LP-b-1000-1	23	24	22	24	23	23	27	25	23	23	23	23	23	23	23	23	24	23	23	1,050
16	LP-b-1000-2	27	27	27	27	27	27	18	23	26	26	27	27	27	27	27	27	26	27	27	1,167
17	C-HL-a-100-2	7	6	7	6	7	7	6	6	8	5	7	9	5	7	7	7	5	7	7	307
18	C-HL-a-100-3	5	4	4	4	5	5	9	4	5	4	5	5	4	4	5	5	4	5	5	227
19	C-HL-b-400-2	9	8	13	10	9	9	4	7	7	18	12	6	9	10	11	11	8	13	9	470
20	C-HL-b-400-3	12	10	16	9	11	11	11	12	11	17	13	11	10	9	10	12	14	11	12	575
21	C-LP-a-100-1	11	11	9	11	13	12	13	11	13	6	10	14	11	11	12	9	7	9	11	462
22	C-LP-a-100-2	15	16	11	16	16	16	15	15	16	7	17	16	16	17	17	17	10	17	15	656
23	C-LP-a-100-3	16	15	12	15	17	17	19	16	18	8	16	17	15	15	16	16	11	16	16	665
24	C-LP-b-400-1	19	17	19	19	20	20	21	19	20	14	20	19	17	20	20	20	12	20	20	843
25	C-LP-b-400-3	24	23	24	23	24	24	22	24	25	16	24	24	22	24	24	24	20	24	24	1,034
26	C-LP-b-1000-1	22	20	21	21	22	22	26	21	22	15	22	22	20	22	22	22	16	22	22	950
27	C-LP-b-1000-2	25	25	26	26	25	26	17	20	24	20	26	25	24	26	26	26	23	26	26	1,095

Planning Unit 1 - MCDA Trend Analysis
(Scenario 1; Low Uncertainty)

Plan #	Alternative	Total Ranking Score (All Respondants)	Rank
5	NS-1000	85	1
3	NS-100	106	2
4	NS-400	127	3
18	C-HL-a-100-3	227	4
2	Coastal	283	5
7	HL-a-100-3	297	6
17	C-HL-a-100-2	307	7
6	HL-a-100-2	373	8
21	C-LP-a-100-1	462	9
19	C-HL-b-400-2	470	10
10	LP-a-100-1	554	11
8	HL-b-400-2	567	12
20	C-HL-b-400-3	575	13
22	C-LP-a-100-2	656	14
23	C-LP-a-100-3	665	15
9	HL-b-400-3	675	16
11	LP-a-100-2	756	17
12	LP-a-100-3	779	18
24	C-LP-b-400-1	843	19
1	No Action	847	20
13	LP-b-400-1	941	21
26	C-LP-b-1000-1	950	22
25	C-LP-b-400-3	1034	23
15	LP-b-1000-1	1050	24
27	C-LP-b-1000-2	1095	25
14	LP-b-400-3	1119	26
16	LP-b-1000-2	1167	27

Planning Unit 1

MCDA Trend Analysis (Ranked by Total Ranking Scores - All Respondants)

Rank	Scenario 1 Low RSLR High Employment Dispersed Population	Scenario 2 High RSLR High Employment Dispersed Population	Scenario 3 Low RSLR Business-as-Usual Compact Population	Scenario 4 High RSLR Business-as-Usual Compact Population
1	NS-1000	NS-1000	NS-100	NS-1000
2	NS-100	NS-400	NS-1000	NS-100
3	NS-400	NS-100	NS-400	NS-400
4	C-HL-a-100-3	C-HL-a-100-3	C-HL-a-100-3	C-HL-a-100-3
5	Coastal	HL-a-100-3	Coastal	Coastal
6	HL-a-100-3	Coastal	HL-a-100-3	HL-a-100-3
7	C-HL-a-100-2	C-HL-a-100-2	C-HL-a-100-2	C-HL-a-100-2
8	HL-a-100-2	HL-a-100-2	HL-a-100-2	HL-a-100-2
9	C-LP-a-100-1	C-LP-a-100-1	C-LP-a-100-1	C-LP-a-100-1
10	C-HL-b-400-2	C-HL-b-400-2	C-HL-b-400-2	C-HL-b-400-2
11	LP-a-100-1	C-HL-b-400-3	LP-a-100-1	C-HL-b-400-3
12	HL-b-400-2	LP-a-100-1	HL-b-400-2	LP-a-100-1
13	C-HL-b-400-3	HL-b-400-2	C-HL-b-400-3	HL-b-400-2
14	C-LP-a-100-2	C-LP-a-100-2	C-LP-a-100-2	HL-b-400-3
15	C-LP-a-100-3	HL-b-400-3	HL-b-400-3	C-LP-a-100-2
16	HL-b-400-3	C-LP-a-100-3	C-LP-a-100-3	C-LP-a-100-3
17	LP-a-100-2	LP-a-100-2	LP-a-100-2	LP-a-100-2
18	LP-a-100-3	LP-a-100-3	LP-a-100-3	LP-a-100-3
19	C-LP-b-400-1	C-LP-b-400-1	No Action	C-LP-b-400-1
20	No Action	LP-b-400-1	C-LP-b-400-1	No Action
21	LP-b-400-1	C-LP-b-1000-1	LP-b-400-1	LP-b-400-1
22	C-LP-b-1000-1	No Action	C-LP-b-1000-1	C-LP-b-1000-1
23	C-LP-b-400-3	C-LP-b-400-3	LP-b-1000-1	C-LP-b-400-3
24	LP-b-1000-1	LP-b-1000-1	C-LP-b-400-3	LP-b-1000-1
25	C-LP-b-1000-2	LP-b-400-3	LP-b-400-3	LP-b-400-3
26	LP-b-400-3	C-LP-b-1000-2	C-LP-b-1000-2	C-LP-b-1000-2
27	LP-b-1000-2	LP-b-1000-2	LP-b-1000-2	LP-b-1000-2

Planning Unit 1
Evaluation Criteria Values
(Scenario 1, Low Relative Sea Level Rise, High Employment, Dispersed Population; Low Confidence)

Plan #	Alternative	Stakeholder (Multi-Criteria Decision Analysis)	Minimizing Environmental Impacts		Investment Decision (Efficiency)			Minimizing Remaining Risk (Effectiveness)			Year 2025 Present Value Life Cycle Costs (2010-2075) ($Millions)
Evaluation Criteria		Cumulative Ranking Score from MCDA Trend Analysis	Direct Wetland Impact	Indirect Impacts	Cost Efficiency	Total System Costs	Period of Analysis Cost Efficiency	Annualized Residual Damages	Period of Analysis Risk Reduction	Average % Risk Reduction	
(Units)		(Unit-less Weight)	(Acres)	(Unit-less Scale)	Ratio: Risk Reduction / Present Value Life Cycle Costs (PV LCC)	Annualized Life Cycle Costs + EA Residual Damages ($Millions)	Cost Efficiency Ratio: Event Freq Risk Reduction X Probability of Occurrence (2010-2075) / PV LCC	Average Annual Remaining Risk (Millions)	Event Freq Risk Reduction X Probability (2010-2075) ($Millions)	2075: 100-yr to 2,000-yr Frequency Events (Avg % of No Action Damages)	
2	Coastal	283	0	0	0.0277	1,649	1.01	1,106	10,789	31.34	10,668
3	NS-100	106	0	0	0.0391	1,606	0.83	732	14,261	41.94	17,119
4	NS-400	127	0	0	0.0272	2,224	0.67	463	23,035	61.86	34,538
5	NS-1000	85	0	0	0.0205	2,919	0.56	384	27,882	78.81	49,732
6	HL-a-100-2	373	4,200	-2	0.0151	2,475	0.46	950	13,686	41.81	29,860
7	HL-a-100-3	297	3,600	-1	0.0166	2,317	0.51	961	13,455	41.02	26,559
8	HL-b-400-2	567	6,000	-2	0.0100	3,873	0.46	797	27,659	87.06	60,234
9	HL-b-400-3	675	5,500	-2	0.0106	3,647	0.49	810	27,167	85.50	55,561
10	LP-a-100-1	554	1,000	-8	0.0281	1,807	1.07	904	18,914	52.13	17,690
11	LP-a-100-2	756	4,100	-8	0.0169	2,533	0.62	842	20,651	57.88	33,109
12	LP-a-100-3	779	3,700	-8	0.0174	2,472	0.64	850	20,411	57.04	31,758
13	LP-b-400-1	941	4,200	-8	0.0144	2,727	0.68	678	24,547	75.78	36,204
14	LP-b-400-3	1119	7,500	-8	0.0106	3,658	0.49	811	27,314	85.01	55,747
15	LP-b-1000-1	1050	5,100	-8	0.0120	3,121	0.57	874	25,211	79.55	44,005
16	LP-b-1000-2	1167	9,100	-8	0.0086	4,373	0.41	796	28,547	91.19	70,064
17	C-HL-a-100-2	307	4,200	-2	0.0161	2,545	0.45	873	14,900	45.18	32,756
18	C-HL-a-100-3	227	3,600	-1	0.0179	2,384	0.50	870	14,829	44.84	29,661
19	C-HL-b-400-2	470	6,000	-2	0.0109	3,946	0.46	708	29,328	91.73	63,416
20	C-HL-b-400-3	575	5,500	-2	0.0118	3,715	0.49	704	29,165	91.11	58,975
21	C-LP-a-100-1	462	1,000	-8	0.0305	1,845	0.99	744	21,308	59.95	21,559
22	C-LP-a-100-2	656	4,100	-8	0.0181	2,586	0.62	751	22,151	62.63	35,929
23	C-LP-a-100-3	685	3,700	-8	0.0187	2,523	0.63	750	22,039	62.20	34,735
24	C-LP-b-400-1	843	4,200	-8	0.0170	2,832	0.67	684	28,159	86.92	42,061
25	C-LP-b-400-3	1034	7,500	-8	0.0118	3,713	0.50	705	29,172	90.83	58,919
26	C-LP-b-1000-1	950	5,100	-8	0.0145	3,246	0.59	667	29,767	94.09	50,512
27	C-LP-b-1000-2	1095	9,100	-8	0.0096	4,451	0.41	697	30,329	96.85	73,523

Planning Unit 1

Evaluation Criteria Data – Ordinal Rankings

(Scenario 1, Low Relative Sea Level Rise, High Employment, Dispersed Population; Low Uncertainty)

Plan #	Alternative	Stakeholder (Multi-Criteria Decision Analysis)	Minimizing Environmental Impacts		Investment Decision (Efficiency)			Minimizing Remaining Risk (Effectiveness)			Year 2025 Present Value Life Cycle Costs (2010-2075) ($Millions)
Evaluation Criteria		Cumulative Ranking Score from MCDA Trend Analysis	Direct Wetland Impact	Indirect Impacts	Cost Efficiency	Total System Costs	Period of Analysis Cost Efficiency	Annualized Residual Damages	Period of Analysis Risk Reduction	Average % Risk Reduction	
(Units)		(Unit-less Weight)	(Acres)	(Unit-less Scale)	Ratio: Risk Reduction / Present Value Life Cycle Costs (PV LCC)	Annualized Life Cycle Costs + EA Residual Damages ($Millions)	Cost Efficiency Ratio: Event Freq Risk Reduction X Probability of Occurrence (2010-2075) / PV LCC	Average Annual Remaining Risk (Millions)	Event Freq Risk Reduction X Probability (2010-2075) ($Millions)	2075: 100-yr to 2,000-yr Frequency Events (Avg % of No Action Damages)	
2	Coastal (R2)	5	2	2	4	2	2	27	27	27	1
3	NS-100	2	1	1	1	1	4	9	24	24	2
4	NS-400	3	3	3	5	5	7	2	15	17	12
5	NS-1000	1	4	4	6	17	15	1	8	13	18
6	HL-a-100-2	8	14	7	16	9	24	25	25	25	7
7	HL-a-100-3	6	7	5	14	6	16	26	26	26	5
8	HL-b-400-2	13	22	12	25	24	23	15	9	7	24
9	HL-b-400-3	17	20	9	23	20	21	16	12	9	20
10	LP-a-100-1	12	5	14	3	3	1	24	21	21	3
11	LP-a-100-2	18	12	18	13	12	10	18	19	19	10
12	LP-a-100-3	19	9	16	10	8	8	19	20	20	8
13	LP-b-400-1	21	16	20	18	15	5	23	14	14	15
14	LP-b-400-3	26	24	24	24	21	20	17	10	10	21
15	LP-b-1000-1	24	18	22	19	18	14	22	13	12	17
16	LP-b-1000-2	27	26	26	27	26	27	14	6	4	26
17	C-HL-a-100-2	7	15	8	15	13	25	21	22	22	9
18	C-HL-a-100-3	4	8	6	9	7	17	20	23	23	6
19	C-HL-b-400-2	10	23	13	22	25	22	8	3	3	25
20	C-HL-b-400-3	14	21	10	21	23	19	6	5	5	23
21	C-LP-a-100-1	9	6	15	2	4	3	10	18	18	4
22	C-LP-a-100-2	15	13	19	8	14	12	13	16	15	14
23	C-LP-a-100-3	16	10	17	7	10	9	12	17	16	13
24	C-LP-b-400-1	20	17	21	12	16	6	4	7	8	16
25	C-LP-b-400-3	23	25	25	20	22	18	7	4	6	22
26	C-LP-b-1000-1	22	19	23	17	19	13	3	2	2	19
27	C-LP-b-1000-2	25	27	27	26	27	26	5	1	1	27

Planning Unit 1
Cost Efficiency Analysis
(Scenario 1- LRSLR, High Employment, Dispersed Population; Low Uncertainty)

Plan #	Alternative	Present Value Life-Cycle Costs ($ Millions)	Risk Reduction Annual Equivalent ($ Millions)	Cost Efficiency Factor Risk Red / PV Costs	Rank
3	NS-0100	17,119	669	0.0391	1
21	C-LP-1a-0100-1	21,559	657	0.0305	2
10	LP-1a-0100-1	17,690	497	0.0281	3
2	Coastal	10,666	295	0.0277	4
4	NS-0400	34,538	939	0.0272	5
5	NS-1000	49,732	1,018	0.0205	6
23	C-LP-1a-0100-3	34,735	651	0.0187	7
22	C-LP-1a-0100-2	35,929	650	0.0181	8
18	C-HL-1a-0100-3	29,661	532	0.0179	9
12	LP-1a-0100-3	31,758	551	0.0174	10
24	C-LP-1b-0400-1	42,061	717	0.0170	11
11	LP-1a-0100-2	33,109	559	0.0169	12
7	HL-1a-0100-3	26,559	440	0.0166	13
17	C-HL-1a-0100-2	32,756	529	0.0161	14
6	HL-1a-0100-2	29,860	451	0.0151	15
26	C-LP-1b-1000-1	50,512	734	0.0145	16
13	LP-1b-0400-1	36,204	523	0.0144	17
15	LP-1b-1000-1	44,005	527	0.0120	18
25	C-LP-1b-0400-3	58,919	697	0.0118	19
20	C-HL-1b-0400-3	58,975	697	0.0118	20
19	C-HL-1b-0400-2	63,416	693	0.0109	21
9	HL-1b-0400-3	55,561	591	0.0106	22
14	LP-1b-0400-3	55,747	590	0.0106	23
8	HL-1b-0400-2	60,234	604	0.0100	24
27	C-LP-1b-1000-2	73,523	704	0.0096	25
16	LP-1b-1000-2	70,064	606	0.0086	26

Planning Unit 1

Cost Efficiency Rankings

Rank	Scenario 1 Low RSLR High Employment Dispersed Population	Scenario 2 High RSLR High Employment Dispersed Population	Scenario 3 Low RSLR Business-as-Usual Compact Population	Scenario 4 High RSLR Business-as-Usual Compact Population
1	NS-0100	Coastal	NS-0100	NS-0100
2	C-LP-1a-0100-1	NS-0100	C-LP-1a-0100-1	Coastal
3	LP-1a-0100-1	LP-1a-0100-1	LP-1a-0100-1	LP-1a-0100-1
4	Coastal	C-LP-1a-0100-1	NS-0400	C-LP-1a-0100-1
5	NS-0400	NS-0400	Coastal	NS-0400
6	NS-1000	HL-1a-0100-3	NS-1000	C-HL-1a-0100-3
7	C-LP-1a-0100-3	C-HL-1a-0100-3	C-LP-1a-0100-3	HL-1a-0100-3
8	C-LP-1a-0100-2	NS-1000	C-LP-1a-0100-2	C-LP-1a-0100-3
9	C-HL-1a-0100-3	LP-1a-0100-3	C-HL-1a-0100-3	LP-1a-0100-3
10	LP-1a-0100-3	C-LP-1a-0100-3	LP-1a-0100-3	NS-1000
11	C-LP-1b-0400-1	HL-1a-0100-2	LP-1a-0100-2	C-LP-1a-0100-2
12	LP-1a-0100-2	LP-1a-0100-2	C-LP-1b-0400-1	C-HL-1a-0100-2
13	HL-1a-0100-3	C-HL-1a-0100-2	C-HL-1a-0100-2	LP-1a-0100-2
14	C-HL-1a-0100-2	C-LP-1a-0100-2	HL-1a-0100-3	HL-1a-0100-2
15	HL-1a-0100-2	C-LP-1b-0400-1	HL-1a-0100-2	C-LP-1b-0400-1
16	C-LP-1b-1000-1	LP-1b-0400-1	LP-1b-0400-1	LP-1b-0400-1
17	LP-1b-0400-1	C-LP-1b-1000-1	C-LP-1b-1000-1	C-LP-1b-1000-1
18	LP-1b-1000-1	LP-1b-1000-1	C-HL-1b-0400-3	LP-1b-1000-1
19	C-LP-1b-0400-3	C-LP-1b-0400-3	C-LP-1b-0400-3	C-HL-1b-0400-3
20	C-HL-1b-0400-3	C-HL-1b-0400-3	LP-1b-1000-1	C-LP-1b-0400-3
21	C-HL-1b-0400-2	LP-1b-0400-3	C-HL-1b-0400-2	LP-1b-0400-3
22	HL-1b-0400-3	HL-1b-0400-3	LP-1b-0400-3	HL-1b-0400-3
23	LP-1b-0400-3	C-HL-1b-0400-2	HL-1b-0400-3	C-HL-1b-0400-2
24	HL-1b-0400-2	HL-1b-0400-2	HL-1b-0400-2	HL-1b-0400-2
25	C-LP-1b-1000-2	C-LP-1b-1000-2	C-LP-1b-1000-2	C-LP-1b-1000-2
26	LP-1b-1000-2	LP-1b-1000-2	LP-1b-1000-2	LP-1b-1000-2

Planning Unit 1
Total System Costs Analysis
(Scenario 1- LRSLR, High Employment, Dispersed Population; Low Uncertainty)

Plan #	Alternative	Annual Equivalent Life-Cycle Costs ($Millions)	With Project Residual Damages ($ Millions)	Total System Costs ($ Millions)	Rank
3	NS-0100	873	732	1,606	1
2	Coastal	543	1,106	1,649	2
10	LP-1a-0100-1	903	904	1,807	3
21	C-LP-1a-0100-1	1,100	744	1,845	4
4	NS-0400	1,761	463	2,224	5
7	HL-1a-0100-3	1,356	961	2,317	6
18	C-HL-1a-0100-3	1,514	870	2,384	7
12	LP-1a-0100-3	1,622	850	2,472	8
6	HL-1a-0100-2	1,525	950	2,475	9
23	C-LP-1a-0100-3	1,773	750	2,523	10
11	LP-1a-0100-2	1,691	842	2,533	11
17	C-HL-1a-0100-2	1,672	873	2,545	12
22	C-LP-1a-0100-2	1,834	751	2,586	13
13	LP-1b-0400-1	1,849	878	2,727	14
24	C-LP-1b-0400-1	2,147	684	2,832	15
5	NS-1000	2,535	384	2,919	16
15	LP-1b-1000-1	2,247	874	3,121	17
26	C-LP-1b-1000-1	2,579	667	3,246	18
9	HL-1b-0400-3	2,837	810	3,647	19
14	LP-1b-0400-3	2,847	811	3,658	20
25	C-LP-1b-0400-3	3,008	705	3,713	21
20	C-HL-1b-0400-3	3,011	704	3,715	22
8	HL-1b-0400-2	3,076	797	3,873	23
19	C-HL-1b-0400-2	3,238	708	3,946	24
16	LP-1b-1000-2	3,578	796	4,373	25
27	C-LP-1b-1000-2	3,754	697	4,451	26

Planning Unit 1

Total System Costs Rankings

Rank	Scenario 1 Low RSLR High Employment Dispersed Population	Scenario 2 High RSLR High Employment Dispersed Population	Scenario 3 Low RSLR Business-as-Usual Compact Population	Scenario 4 High RSLR Business-as-Usual Compact Population
1	NS-0100	NS-0100	NS-0100	NS-0100
2	Coastal	Coastal	Coastal	Coastal
3	LP-1a-0100-1	LP-1a-0100-1	LP-1a-0100-1	LP-1a-0100-1
4	C-LP-1a-0100-1	C-LP-1a-0100-1	C-LP-1a-0100-1	C-LP-1a-0100-1
5	NS-0400	NS-0400	HL-1a-0100-3	HL-1a-0100-3
6	HL-1a-0100-3	HL-1a-0100-3	C-HL-1a-0100-3	C-HL-1a-0100-3
7	C-HL-1a-0100-3	C-HL-1a-0100-3	NS-0400	NS-0400
8	LP-1a-0100-3	HL-1a-0100-2	LP-1a-0100-3	HL-1a-0100-2
9	HL-1a-0100-2	LP-1a-0100-3	HL-1a-0100-2	LP-1a-0100-3
10	C-LP-1a-0100-3	C-HL-1a-0100-2	C-LP-1a-0100-3	C-HL-1a-0100-2
11	LP-1a-0100-2	C-LP-1a-0100-3	C-HL-1a-0100-2	C-LP-1a-0100-3
12	C-HL-1a-0100-2	LP-1a-0100-2	LP-1a-0100-2	LP-1a-0100-2
13	C-LP-1a-0100-2	C-LP-1a-0100-2	C-LP-1a-0100-2	C-LP-1a-0100-2
14	LP-1b-0400-1	NS-1000	LP-1b-0400-1	LP-1b-0400-1
15	C-LP-1b-0400-1	LP-1b-0400-1	C-LP-1b-0400-1	C-LP-1b-0400-1
16	NS-1000	C-LP-1b-0400-1	NS-1000	NS-1000
17	LP-1b-1000-1	LP-1b-1000-1	LP-1b-1000-1	LP-1b-1000-1
18	C-LP-1b-1000-1	C-LP-1b-1000-1	C-LP-1b-1000-1	C-LP-1b-1000-1
19	HL-1b-0400-3	LP-1b-0400-3	LP-1b-0400-3	LP-1b-0400-3
20	LP-1b-0400-3	HL-1b-0400-3	HL-1b-0400-3	HL-1b-0400-3
21	C-LP-1b-0400-3	C-LP-1b-0400-3	C-LP-1b-0400-3	C-LP-1b-0400-3
22	C-HL-1b-0400-3	C-HL-1b-0400-3	C-HL-1b-0400-3	C-HL-1b-0400-3
23	HL-1b-0400-2	HL-1b-0400-2	HL-1b-0400-2	HL-1b-0400-2
24	C-HL-1b-0400-2	C-HL-1b-0400-2	C-HL-1b-0400-2	C-HL-1b-0400-2
25	LP-1b-1000-2	LP-1b-1000-2	LP-1b-1000-2	LP-1b-1000-2
26	C-LP-1b-1000-2	C-LP-1b-1000-2	C-LP-1b-1000-2	C-LP-1b-1000-2

Planning Unit 1
Period of Analysis Cost Efficiency
(2075 Risk Reduction X Probablility (2010-2075) / Present Value Costs For Frequency Events Included in Economic Evaluation)
(Scenario 1: Low RSLR, High Employment, Dispersed Population - Low Uncertainty)

Plan #	Alternative	Remaining Damages by Frequency ($Billions)					Total Risk Reduction X Probability 2010-2075 ($ Billions)	Present Value - Life-Cycle Costs ($ Billions)	Cost Efficiency Ratio - Total Risk Reduction / PV Costs	Rank
		10-yr	100-yr	400-yr	1000-yr	2000-yr				
No Action Damages ($ Billions)		1.2	11.9	89.9	118.3	122.3				
10	LP-a-100-1	1.0	4.2	19.7	54.3	108.1	18.9	17.7	1.07	1
2	Coastal	1.2	6.0	54.5	78.8	119.2	10.8	10.7	1.01	2
21	C-LP-a-100-1	0.7	1.7	16.3	50.4	104.2	21.3	21.6	0.99	3
3	NS-100	0.5	2.2	50.6	74.9	115.4	14.3	17.1	0.83	4
13	LP-b-400-1	1.0	4.1	11.2	20.4	39.6	24.5	36.2	0.68	5
24	C-LP-b-400-1	0.7	1.2	2.8	14.2	33.5	28.2	42.1	0.67	6
4	NS-400	0.2	0.8	5.4	62.0	106.8	23.0	34.5	0.67	7
12	LP-a-100-3	1.0	2.7	16.5	51.2	106.6	20.4	31.8	0.64	8
23	C-LP-a-100-3	0.7	1.2	14.2	48.4	103.7	22.0	34.7	0.63	9
11	LP-a-100-2	0.9	2.5	16.2	50.6	105.8	20.7	33.1	0.62	10
22	C-LP-a-100-2	0.7	1.1	14.0	47.8	103.0	22.2	35.9	0.62	11
26	C-LP-b-1000-1	0.7	1.1	1.4	3.3	12.0	29.8	50.5	0.59	12
15	LP-b-1000-1	1.0	4.1	11.1	18.3	23.5	25.2	44.0	0.57	13
5	NS-1000	0.1	0.6	2.1	5.1	89.3	27.9	49.7	0.56	14
7	HL-a-100-3	1.0	2.4	52.2	72.8	117.7	13.5	26.6	0.51	15
18	C-HL-a-100-3	0.7	1.4	49.8	70.2	114.9	14.8	29.7	0.50	16
25	C-LP-b-400-3	0.7	1.0	1.3	6.9	25.7	29.2	58.9	0.50	17
20	C-HL-b-400-3	0.7	1.0	1.8	6.6	23.8	29.2	59.0	0.49	18
14	LP-b-400-3	1.0	2.7	4.4	10.3	29.3	27.3	55.7	0.49	19
9	HL-b-400-3	1.0	2.2	6.5	11.1	28.0	27.2	55.6	0.49	20
19	C-HL-b-400-2	0.7	1.0	1.5	5.7	22.5	29.3	63.4	0.46	21
8	HL-b-400-2	1.0	2.0	5.5	9.5	26.1	27.7	60.2	0.46	22
6	HL-a-100-2	1.0	2.2	52.1	72.4	116.8	13.7	29.9	0.46	23
17	C-HL-a-100-2	0.7	1.4	49.8	69.9	114.2	14.9	32.8	0.45	24
27	C-LP-b-1000-2	0.7	0.9	1.0	1.4	3.1	30.3	73.5	0.41	25
16	LP-b-1000-2	0.9	2.5	3.9	5.3	7.2	28.5	70.1	0.41	26

Planning Unit 1

Period of Analysis Cost Efficiency Rankings

(2075 Risk Reduction X Probability (2010 - 2075) / Present Value Costs Rankings For Frequency Events Included in Economic Evaluation)

Rank	Scenario 1 Low RSLR High Employment Dispersed Population	Scenario 2 High RSLR High Employment Dispersed Population	Scenario 3 Low RSLR Business-as-Usual Compact Population	Scenario 4 High RSLR Business-as-Usual Compact Population
1	LP-a-100-1	Coastal	LP-a-100-1	Coastal
2	Coastal	LP-a-100-1	C-LP-a-100-1	LP-a-100-1
3	C-LP-a-100-1	C-LP-a-100-1	Coastal	C-LP-a-100-1
4	NS-100	NS-100	NS-100	NS-100
5	LP-b-400-1	LP-a-100-3	LP-b-400-1	LP-a-100-3
6	C-LP-b-400-1	LP-a-100-2	LP-a-100-3	LP-a-100-2
7	NS-400	C-LP-a-100-3	C-LP-b-400-1	C-LP-a-100-3
8	LP-a-100-3	NS-400	C-LP-a-100-3	C-LP-a-100-2
9	C-LP-a-100-3	LP-b-400-1	LP-a-100-2	HL-a-100-3
10	LP-a-100-2	C-LP-a-100-2	C-LP-a-100-2	LP-b-400-1
11	C-LP-a-100-2	HL-a-100-3	NS-400	C-HL-a-100-3
12	C-LP-b-1000-1	C-LP-b-400-1	C-LP-b-1000-1	C-LP-b-400-1
13	LP-b-1000-1	C-HL-a-100-3	NS-1000	NS-400
14	NS-1000	HL-a-100-2	C-HL-b-400-3	HL-a-100-2
15	HL-a-100-3	C-HL-a-100-2	C-HL-a-100-3	C-HL-a-100-2
16	C-HL-a-100-3	C-LP-b-1000-1	C-LP-b-400-3	LP-b-1000-1
17	C-LP-b-400-3	LP-b-1000-1	LP-b-400-3	C-LP-b-1000-1
18	C-HL-b-400-3	NS-1000	HL-b-400-3	NS-1000
19	LP-b-400-3	LP-b-400-3	HL-a-100-3	LP-b-400-3
20	HL-b-400-3	C-LP-b-400-3	C-HL-b-400-2	C-LP-b-400-3
21	C-HL-b-400-2	C-HL-b-400-3	HL-b-400-2	HL-b-400-3
22	HL-b-400-2	HL-b-400-3	LP-b-1000-1	C-HL-b-400-3
23	HL-a-100-2	C-HL-b-400-2	C-HL-a-100-2	HL-b-400-2
24	C-HL-a-100-2	HL-b-400-2	HL-a-100-2	C-HL-b-400-2
25	C-LP-b-1000-2	LP-b-1000-2	C-LP-b-1000-2	LP-b-1000-2
26	LP-b-1000-2	C-LP-b-1000-2	LP-b-1000-2	C-LP-b-1000-2

Planning Unit 1
Residual Damages (Remaining Risk) Analysis
(Scenario 1: Low RSLR, High Employment, Dispersed Population - Low Uncertainty)

Plan #	Alternative	No Action Residual Damages ($Millions)	With Project Residual Damages ($ Millions)	% of No Action Damages	Rank
5	NS-1000	1,401	384	27.4	1
4	NS-0400	1,401	463	33.0	2
26	C-LP-1b-1000-1	1,401	667	47.6	3
24	C-LP-1b-0400-1	1,401	684	48.8	4
27	C-LP-1b-1000-2	1,401	697	49.8	5
20	C-HL-1b-0400-3	1,401	704	50.3	6
25	C-LP-1b-0400-3	1,401	705	50.3	7
19	C-HL-1b-0400-2	1,401	708	50.5	8
3	NS-0100	1,401	732	52.3	9
21	C-LP-1a-0100-1	1,401	744	53.1	10
23	C-LP-1a-0100-3	1,401	750	53.5	11
22	C-LP-1a-0100-2	1,401	751	53.6	12
16	LP-1b-1000-2	1,401	796	56.8	13
8	HL-1b-0400-2	1,401	797	56.9	14
9	HL-1b-0400-3	1,401	810	57.8	15
14	LP-1b-0400-3	1,401	811	57.9	16
11	LP-1a-0100-2	1,401	842	60.1	17
12	LP-1a-0100-3	1,401	850	60.7	18
18	C-HL-1a-0100-3	1,401	870	62.1	19
17	C-HL-1a-0100-2	1,401	873	62.3	20
15	LP-1b-1000-1	1,401	874	62.4	21
13	LP-1b-0400-1	1,401	878	62.7	22
10	LP-1a-0100-1	1,401	904	64.5	23
6	HL-1a-0100-2	1,401	950	67.8	24
7	HL-1a-0100-3	1,401	961	68.6	25
2	Coastal (R2)	1,401	1,106	78.9	26

Planning Unit 1
Residual Damages (Remaining Risk) Rankings

Rank	Scenario 1 Low RSLR High Employment Dispersed Population	Scenario 2 High RSLR High Employment Dispersed Population	Scenario 3 Low RSLR Business-as-Usual Compact Population	Scenario 4 High RSLR Business-as-Usual Compact Population
1	NS-1000	NS-1000	NS-1000	NS-1000
2	NS-0400	NS-0400	NS-0400	NS-0400
3	C-LP-1b-1000-1	NS-0100	C-LP-1b-1000-1	C-LP-1b-1000-1
4	C-LP-1b-0400-1	C-LP-1b-1000-1	C-LP-1b-0400-1	NS-0100
5	C-LP-1b-1000-2	C-LP-1b-1000-2	C-HL-1b-0400-3	C-LP-1b-0400-1
6	C-HL-1b-0400-3	C-LP-1b-0400-1	C-LP-1b-1000-2	C-LP-1b-1000-2
7	C-LP-1b-0400-3	C-HL-1b-0400-3	C-HL-1b-0400-2	C-HL-1b-0400-3
8	C-HL-1b-0400-2	C-LP-1b-0400-3	C-LP-1b-0400-3	C-HL-1b-0400-2
9	NS-0100	C-HL-1b-0400-2	C-LP-1a-0100-1	C-LP-1b-0400-3
10	C-LP-1a-0100-1	C-LP-1a-0100-2	C-LP-1a-0100-3	C-LP-1a-0100-2
11	C-LP-1a-0100-3	C-LP-1a-0100-3	C-LP-1a-0100-2	C-LP-1a-0100-3
12	C-LP-1a-0100-2	C-LP-1a-0100-1	NS-0100	C-LP-1a-0100-1
13	LP-1b-1000-2	LP-1b-1000-2	LP-1b-1000-2	LP-1b-1000-2
14	HL-1b-0400-2	LP-1a-0100-2	HL-1b-0400-2	HL-1b-0400-2
15	HL-1b-0400-3	LP-1b-0400-3	LP-1b-0400-3	LP-1a-0100-2
16	LP-1b-0400-3	HL-1b-0400-2	HL-1b-0400-3	LP-1b-0400-3
17	LP-1a-0100-2	LP-1a-0100-3	LP-1a-0100-2	LP-1a-0100-3
18	LP-1a-0100-3	C-HL-1a-0100-2	LP-1a-0100-3	HL-1b-0400-3
19	C-HL-1a-0100-3	C-HL-1a-0100-3	C-HL-1a-0100-3	C-HL-1a-0100-2
20	C-HL-1a-0100-2	HL-1b-0400-3	LP-1b-1000-1	C-HL-1a-0100-3
21	LP-1b-1000-1	LP-1b-1000-1	C-HL-1a-0100-2	LP-1b-1000-1
22	LP-1b-0400-1	LP-1b-0400-1	LP-1b-0400-1	LP-1a-0100-1
23	LP-1a-0100-1	LP-1a-0100-1	LP-1a-0100-1	LP-1b-0400-1
24	HL-1a-0100-2	HL-1a-0100-2	HL-1a-0100-2	HL-1a-0100-2
25	HL-1a-0100-3	HL-1a-0100-3	HL-1a-0100-3	HL-1a-0100-3
26	Coastal	Coastal	Coastal	Coastal

Planning Unit 1

Period of Analysis Risk Reduction

(2075 Risk Reduction X Probablility (2010-2075)

For Frequency Events Included in Economic Evaluation)

(Scenario 1: Low RSLR, High Employment, Dispersed Population - 90% Confidence Level)

Plan #	Alternative	Remaining Damages by Frequency ($Millions)					Total Risk Reduction X Probabilty 2010-2075 ($Million)	Rank
		10-yr	100-yr	400-yr	1,000-yr	2,000-yr		
No Action Damages ($ Million)		1,215	11,935	89,937	118,260	122,343		
27	C-LP-b-1000-2	696	931	996	1,362	3,099	30,329	1
26	C-LP-b-1000-1	695	1,125	1,408	3,324	12,020	29,767	2
19	C-HL-b-400-2	703	980	1,531	5,672	22,470	29,328	3
25	C-LP-b-400-3	702	995	1,337	6,866	25,731	29,172	4
20	C-HL-b-400-3	708	1,023	1,793	6,558	23,779	29,165	5
16	LP-b-1000-2	939	2,451	3,853	5,330	7,208	28,547	6
24	C-LP-b-400-1	704	1,175	2,761	14,209	33,494	28,159	7
5	NS-1000	139	618	2,090	5,057	89,283	27,882	8
8	HL-b-400-2	958	1,952	5,474	9,482	26,064	27,659	9
14	LP-b-400-3	959	2,668	4,448	10,316	29,258	27,314	10
9	HL-b-400-3	1,011	2,209	6,516	11,051	28,009	27,167	11
15	LP-b-1000-1	1,033	4,142	11,126	18,304	23,524	25,211	12
13	LP-b-400-1	1,033	4,144	11,216	20,434	39,642	24,547	13
4	NS-400	246	804	5,450	61,995	106,842	23,035	14
22	C-LP-a-100-2	713	1,109	14,016	47,839	102,967	22,151	15
23	C-LP-a-100-3	714	1,166	14,212	48,364	103,665	22,039	16
21	C-LP-a-100-1	723	1,703	16,335	50,410	104,180	21,308	17
11	LP-a-100-2	941	2,536	16,183	50,576	105,784	20,651	18
12	LP-a-100-3	960	2,742	16,545	51,238	106,606	20,411	19
10	LP-a-100-1	1,034	4,200	19,737	54,345	108,114	18,914	20
17	C-HL-a-100-2	717	1,368	49,813	69,880	114,192	14,900	21
18	C-HL-a-100-3	721	1,440	49,754	70,154	114,933	14,829	22
3	NS-100	490	2,191	50,601	74,874	115,364	14,261	23
6	HL-a-100-2	960	2,156	52,133	72,433	116,819	13,686	24
7	HL-a-100-3	1,011	2,398	52,213	72,825	117,664	13,455	25
2	Coastal	1,214	5,957	54,550	78,763	119,248	10,769	26

Planning Unit 1
Period of Analysis Risk Reduction
(2075 Risk Reduction X Probability (2010 - 2075) Rankings
For Frequency Events Included in Economic Evaluation)

Rank	Scenario 1 Low RSLR High Employment Dispersed Population	Scenario 2 High RSLR High Employment Dispersed Population	Scenario 3 Low RSLR Business-as-Usual Compact Population	Scenario 4 High RSLR Business-as-Usual Compact Population
1	C-LP-b-1000-2	C-LP-b-1000-2	C-LP-b-1000-2	C-LP-b-1000-2
2	C-LP-b-1000-1	C-HL-b-400-2	C-LP-b-1000-1	C-HL-b-400-2
3	C-HL-b-400-2	C-LP-b-1000-1	C-HL-b-400-2	C-HL-b-400-3
4	C-LP-b-400-3	C-LP-b-400-3	C-HL-b-400-3	LP-b-1000-2
5	C-HL-b-400-3	C-HL-b-400-3	LP-b-1000-2	C-LP-b-1000-1
6	LP-b-1000-2	LP-b-1000-2	C-LP-b-400-3	C-LP-b-400-3
7	C-LP-b-400-1	NS-1000	NS-1000	HL-b-400-2
8	NS-1000	LP-b-400-3	C-LP-b-400-1	LP-b-400-3
9	HL-b-400-2	C-LP-b-400-1	HL-b-400-2	NS-1000
10	LP-b-400-3	HL-b-400-2	LP-b-400-3	HL-b-400-3
11	HL-b-400-3	HL-b-400-3	HL-b-400-3	C-LP-b-400-1
12	LP-b-1000-1	LP-b-1000-1	LP-b-400-1	LP-b-1000-1
13	LP-b-400-1	LP-b-400-1	NS-400	C-LP-a-100-2
14	NS-400	C-LP-a-100-2	C-LP-a-100-2	LP-b-400-1
15	C-LP-a-100-2	C-LP-a-100-3	C-LP-a-100-3	C-LP-a-100-3
16	C-LP-a-100-3	NS-400	C-LP-a-100-1	NS-400
17	C-LP-a-100-1	LP-a-100-2	LP-a-100-2	LP-a-100-2
18	LP-a-100-2	LP-a-100-3	LP-a-100-3	LP-a-100-3
19	LP-a-100-3	C-LP-a-100-1	LP-b-1000-1	C-LP-a-100-1
20	LP-a-100-1	LP-a-100-1	LP-a-100-1	LP-a-100-1
21	C-HL-a-100-2	C-HL-a-100-2	C-HL-a-100-2	C-HL-a-100-2
22	C-HL-a-100-3	C-HL-a-100-3	C-HL-a-100-3	C-HL-a-100-3
23	NS-100	HL-a-100-2	NS-100	HL-a-100-2
24	HL-a-100-2	HL-a-100-3	HL-a-100-2	HL-a-100-3
25	HL-a-100-3	NS-100	HL-a-100-3	NS-100
26	Coastal	Coastal	Coastal	Coastal

Planning Unit 1

Average % Risk Reduction of Total Damages

For 100-yr to 2,000-yr Frequency Event Range Based on 2075 Population / Land Use

(Scenario 1: Low RSLR, High Employment, Dispersed Population - Low Uncertainty)

Plan #	Alternative	Average % Risk Reduction for 100-yr to 2,000-yr Freq Events	Average Risk Reduction for 100-yr to 2,000-yr Frequency Events ($ Millions)	Life Cycle Costs Equiv. Annual ($ Millions)	Rank
Total No Action Residual Damages 100-yr to 2,000-yr Freq Events ($ Million)		342,474			
27	C-LP-b-1000-2	96.85	331,693	3,754	1
26	C-LP-b-1000-1	94.09	322,242	2,579	2
19	C-HL-b-400-2	91.73	314,155	3,238	3
16	LP-b-1000-2	91.19	312,318	3,578	4
20	C-HL-b-400-3	91.11	312,036	3,011	5
25	C-LP-b-400-3	90.83	311,086	3,008	6
8	HL-b-400-2	87.06	298,153	3,076	7
24	C-LP-b-400-1	86.92	297,689	2,147	8
9	HL-b-400-3	85.50	292,823	2,837	9
14	LP-b-400-3	85.01	291,152	2,847	10
15	LP-b-1000-1	79.55	272,452	2,247	11
5	NS-1000	78.81	269,907	2,535	12
13	LP-b-400-1	75.78	259,535	1,849	13
22	C-LP-a-100-2	62.63	214,485	1,834	14
23	C-LP-a-100-3	62.20	213,019	1,773	15
4	NS-400	61.86	211,866	1,761	16
21	C-LP-a-100-1	59.95	205,306	1,100	17
11	LP-a-100-2	57.88	198,225	1,691	18
12	LP-a-100-3	57.04	195,355	1,622	19
10	LP-a-100-1	52.13	178,548	903	20
17	C-HL-a-100-2	45.18	154,734	1,672	21
18	C-HL-a-100-3	44.84	153,553	1,514	22
3	NS-100	41.94	143,641	873	23
6	HL-a-100-2	41.81	143,183	1,525	24
7	HL-a-100-3	41.02	140,494	1,356	25
2	Coastal	31.34	107,334	543	26

Planning Unit 1
Average % Risk Reduction of Total Damages
For 100-yr to 2,000-yr Frequency Event Range Based on 2075 Population / Land Use

Rank	Scenario 1 Low RSLR High Employment Dispersed Population	Scenario 2 High RSLR High Employment Dispersed Population	Scenario 3 Low RSLR Business-as-Usual Compact Population	Scenario 4 High RSLR Business-as-Usual Compact Population
1	C-LP-b-1000-2	C-LP-b-1000-2	C-LP-b-1000-2	C-LP-b-1000-2
2	C-LP-b-1000-1	LP-b-1000-2	C-LP-b-1000-1	LP-b-1000-2
3	C-HL-b-400-2	C-LP-b-1000-1	LP-b-1000-2	C-HL-b-400-2
4	LP-b-1000-2	C-HL-b-400-2	C-HL-b-400-2	C-LP-b-1000-1
5	C-HL-b-400-3	C-LP-b-400-3	C-HL-b-400-3	C-HL-b-400-3
6	C-LP-b-400-3	C-HL-b-400-3	C-LP-b-400-3	C-LP-b-400-3
7	HL-b-400-2	HL-b-400-2	HL-b-400-2	HL-b-400-2
8	C-LP-b-400-1	LP-b-400-3	HL-b-400-3	HL-b-400-3
9	HL-b-400-3	HL-b-400-3	LP-b-400-3	LP-b-400-3
10	LP-b-400-3	C-LP-b-400-1	C-LP-b-400-1	C-LP-b-400-1
11	LP-b-1000-1	LP-b-1000-1	NS-1000	LP-b-1000-1
12	NS-1000	LP-b-400-1	LP-b-400-1	LP-b-400-1
13	LP-b-400-1	NS-1000	LP-b-1000-1	NS-1000
14	C-LP-a-100-2	C-LP-a-100-2	C-LP-a-100-2	C-LP-a-100-2
15	C-LP-a-100-3	C-LP-a-100-3	C-LP-a-100-3	C-LP-a-100-3
16	NS-400	LP-a-100-2	NS-400	LP-a-100-2
17	C-LP-a-100-1	LP-a-100-3	LP-a-100-2	LP-a-100-3
18	LP-a-100-2	C-LP-a-100-1	C-LP-a-100-1	C-LP-a-100-1
19	LP-a-100-3	NS-400	LP-a-100-3	NS-400
20	LP-a-100-1	LP-a-100-1	LP-a-100-1	LP-a-100-1
21	C-HL-a-100-2	C-HL-a-100-2	C-HL-a-100-2	C-HL-a-100-2
22	C-HL-a-100-3	C-HL-a-100-3	C-HL-a-100-3	C-HL-a-100-3
23	NS-100	HL-a-100-2	HL-a-100-2	HL-a-100-2
24	HL-a-100-2	HL-a-100-3	NS-100	HL-a-100-3
25	HL-a-100-3	NS-100	HL-a-100-3	NS-100
26	Coastal	Coastal	Coastal	Coastal

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Planning Unit 2

Sample Data Rankings and Evaluation Criteria Tables

Planning Unit 2 - Metric Data Summary

(Scenario 1 - Low Relative Sea Level Rise, High Employment, Dispersed Population; Low Uncertainty)

Plan #	Alternative	Population Impacted	Residual Damages	Life Cycle Cost	Construction Time	Employment Impacted	Indirect Environmental Impact Score	Direct Wetland Impacts	Historic Properties Protected	Historic Districts Protected	Archeo. Sites Protected
		Ann. Equiv. #	Ann. Equiv. $ Millions	Ann. Equiv. $ Millions	Years	Ann. Equiv. #	Unit-less Scale -8 to +8	Acres	# Properties	# Districts	# Sites
1	No Action	31,156	2,164	0	15	9,054	0	0	12	0	42
2	Coastal	21,148	967	800	15	3,806	0	0	13	4	154
3	NS-100	19,187	649	1,017	15	2,611	0	0	13	4	154
4	NS-400	16,460	332	1,603	15	1,873	0	0	13	4	154
5	NS-1000	15,909	302	2,294	15	1,058	0	0	13	4	154
6	G-100-1	19,963	831	1,188	11	3,258	-8	1,000	24	8	396
7	G-100-4	17,697	782	1,541	11	3,040	-8	2,200	24	8	396
8	G-400-4	18,067	839	2,574	13	3,262	-8	7,400	25	8	396
9	G-1000-4	18,021	839	2,961	13	3,261	-8	9,500	25	8	396
10	R-100-2	20,398	1,017	1,194	11	4,056	4	700	14	6	160
11	R-100-3	19,537	993	1,318	11	3,967	4	1,000	14	6	160
12	R-100-4	19,105	980	1,481	11	3,849	4	1,600	14	6	171
13	R-400-2	19,489	916	2,097	13	3,570	4	4,400	25	8	160
14	R-400-3	17,898	821	2,246	11	3,173	4	4,700	25	8	160
15	R-400-4	18,233	879	2,406	13	3,366	4	5,300	25	8	171
16	R-1000-4	18,067	870	2,800	13	3,331	4	6,800	25	8	171
17	WBI-100-1	20,935	983	851	6	3,883	2	0	14	6	160
18	WBI-400-1	20,472	944	1,734	12	3,660	2	3,700	25	8	160
19	C-G-100-1	19,020	633	1,343	11	2,558	-8	1,000	24	8	396
20	C-G-100-4	16,755	611	1,671	11	2,484	-8	2,200	24	8	396
21	C-G-400-4	16,772	644	2,691	13	2,492	-8	7,400	25	8	396
22	C-G-1000-4	16,250	630	3,113	13	2,465	-8	9,500	25	8	396
23	C-R-100-2	19,510	821	1,366	11	3,367	4	700	14	6	160
24	C-R-100-3	18,650	814	1,471	11	3,340	4	1,000	14	6	160
25	C-R-100-4	18,217	810	1,626	11	3,307	4	1,600	14	6	171
26	C-R-400-2	18,227	642	2,233	13	2,481	4	4,400	25	8	160
27	C-R-400-3	16,679	573	2,373	11	2,188	4	4,700	25	8	160
28	C-R-400-4	17,014	645	2,523	13	2,522	4	5,300	25	8	171
29	C-R-1000-4	16,628	626	2,943	13	2,462	4	6,800	25	8	171
30	C-WBI-100-1	20,047	739	1,065	6	3,055	2	0	14	6	160
31	C-WBI-400-1	19,210	605	1,912	12	2,337	2	3,700	25	8	160

Planning Unit 2 - Relative Ranking of Alternatives Based On Individual Metrics
(Scenario 1 - Low Relative Sea Level Rise, High Employment, Dispersed Population; Low Uncertainty)

Rank	Population Impacted	Residual Damages	Life Cycle Cost	Construction Time	Employment Impacted	Indirect Environmental Impact Score	Direct Wetland Impacts	Historic Properties Protected	Historic Districts Protected	Archeo. Sites Protected
1	NS-1000	NS-1000	No Action	WBI-100-1	NS-1000	R-100-2	No Action	WBI-400-1	G-100-1	G-100-1
2	C-G-1000-4	NS-400	Coastal	C-WBI-100-1	NS-400	R-100-3	Coastal	C-WBI-400-1	C-G-100-1	C-G-100-1
3	NS-400	C-R-400-3	WBI-100-1	G-100-1	C-R-400-3	C-R-100-2	WBI-100-1	R-400-2	G-100-4	G-100-4
4	C-R-1000-4	C-WBI-400-1	NS-100	R-100-2	C-WBI-400-1	C-R-100-3	NS-100	C-R-400-2	C-G-100-4	C-G-100-4
5	C-R-400-3	C-G-100-4	C-WBI-100-1	R-100-3	C-R-1000-4	R-100-4	C-WBI-100-1	R-400-3	WBI-400-1	G-400-4
6	C-G-100-4	C-R-1000-4	G-100-1	C-G-100-1	C-G-1000-4	C-R-100-4	NS-400	C-R-400-3	C-WBI-400-1	C-G-400-4
7	C-G-400-4	C-G-1000-4	R-100-2	C-R-100-2	C-R-400-2	R-400-2	NS-1000	R-400-4	R-400-2	G-1000-4
8	C-R-400-4	C-G-100-1	R-100-3	C-R-100-3	C-G-100-4	C-R-400-2	R-100-2	C-R-400-4	C-R-400-2	C-G-1000-4
9	G-100-4	C-R-400-2	C-G-100-1	R-100-4	C-G-400-4	R-400-3	C-R-100-2	G-400-4	R-400-3	R-100-4
10	R-400-3	C-G-400-4	C-R-100-2	G-100-4	C-R-400-4	C-R-400-3	G-100-1	C-G-400-4	C-R-400-3	C-R-100-4
11	G-1000-4	C-R-400-4	C-R-100-3	C-R-100-4	C-G-100-1	R-400-4	R-100-3	R-1000-4	R-400-4	R-400-4
12	R-1000-4	NS-100	R-100-4	C-G-100-4	NS-100	C-R-400-4	C-G-100-1	C-R-1000-4	C-R-400-4	C-R-400-4
13	G-400-4	C-WBI-100-1	G-100-4	R-400-3	G-100-4	R-1000-4	C-R-100-3	G-1000-4	G-400-4	R-1000-4
14	C-R-100-4	G-100-4	NS-400	C-R-400-3	C-WBI-100-1	C-R-1000-4	R-100-4	C-G-1000-4	C-G-400-4	C-R-1000-4
15	C-R-400-2	C-R-100-4	C-R-100-4	WBI-400-1	R-400-3	WBI-100-1	C-R-100-4	G-100-1	R-1000-4	WBI-100-1
16	R-400-4	C-R-100-3	C-G-100-4	C-WBI-400-1	G-100-1	C-WBI-100-1	G-100-4	C-G-100-1	C-R-1000-4	C-WBI-100-1
17	C-R-100-3	R-400-3	WBI-400-1	R-400-2	G-1000-4	WBI-400-1	C-G-100-4	G-100-4	G-1000-4	R-100-2
18	C-G-100-1	C-R-100-2	C-WBI-400-1	C-R-400-2	G-400-4	C-WBI-400-1	WBI-400-1	C-G-100-4	C-G-1000-4	R-100-3
19	R-100-4	G-100-1	R-400-2	R-400-4	C-R-100-4	No Action	C-WBI-400-1	WBI-100-1	WBI-100-1	C-R-100-2
20	NS-100	G-1000-4	C-R-400-2	C-R-400-4	R-1000-4	Coastal	R-400-2	C-WBI-100-1	C-WBI-100-1	C-R-100-3
21	C-WBI-400-1	G-400-4	R-400-3	G-400-4	C-R-100-3	NS-100	C-R-400-2	R-100-2	R-100-2	WBI-400-1
22	R-400-2	R-1000-4	NS-1000	C-G-400-4	R-400-4	NS-400	R-400-3	R-100-3	R-100-3	C-WBI-400-1
23	C-R-100-2	R-400-4	C-R-400-3	R-1000-4	C-R-100-2	NS-1000	C-R-400-3	C-R-100-2	C-R-100-2	R-400-2
24	R-100-3	R-400-2	R-400-4	C-R-1000-4	R-400-2	G-100-1	R-400-4	C-R-100-3	C-R-100-3	C-R-400-2
25	G-100-1	WBI-400-1	C-R-400-4	G-1000-4	WBI-400-1	C-G-100-1	C-R-400-4	R-100-4	R-100-4	R-400-3
26	C-WBI-100-1	Coastal	G-400-4	C-G-1000-4	Coastal	G-100-4	R-1000-4	C-R-100-4	C-R-100-4	C-R-400-3
27	R-100-2	R-100-4	C-G-400-4	No Action	R-100-4	C-G-100-4	C-R-1000-4	Coastal	Coastal	Coastal
28	WBI-400-1	WBI-100-1	R-1000-4	Coastal	WBI-100-1	G-400-4	G-400-4	NS-100	NS-100	NS-100
29	WBI-100-1	R-100-3	C-R-1000-4	NS-100	R-100-3	C-G-400-4	C-G-400-4	NS-400	NS-400	NS-400
30	Coastal	R-100-2	G-1000-4	NS-400	R-100-2	G-1000-4	G-1000-4	NS-1000	NS-1000	NS-1000
31	No Action	No Action	C-G-1000-4	NS-1000	No Action	C-G-1000-4	C-G-1000-4	No Action	No Action	No Action

Planning Unit 2 - Multi-Criteria Decision Analysis (MCDA) Trend Analysis

(Scenario 1 - Low Relative Sea Level Rise, High Employment, Dispersed Population; Low Uncertainty)

Plan #	Alternative	Plan Rank By Each Respondant																											Total Ranking Score (All Respondants)
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	
30	C-WBI-100-1	1	1	1	19	1	1	1	1	1	2	1	1	8	1	1	1	1	1	1	1	1	1	1	1	1	1	1	53
23	C-R-100-2	3	2	3	20	3	3	3	3	3	5	3	4	3	9	2	6	3	5	4	4	3	3	4	2	2	3	3	111
17	WBI-100-1	2	4	2	22	2	5	6	2	5	8	2	2	11	4	3	2	2	3	2	3	6	2	2	3	4	2	2	113
24	C-R-100-3	5	3	4	21	4	4	5	4	4	10	4	3	5	8	4	5	4	4	5	5	2	4	5	4	3	4	5	138
27	C-R-400-3	12	12	8	5	9	2	10	8	2	1	6	7	1	17	11	9	5	2	3	2	5	11	11	6	10	10	4	189
10	R-100-2	4	7	5	23	5	11	9	5	6	13	8	9	4	14	5	14	8	14	6	9	9	5	7	7	6	6	6	225
25	C-R-100-4	7	5	7	25	7	6	7	9	9	15	5	5	13	10	7	10	6	6	10	13	4	6	12	5	5	5	9	228
11	R-100-3	6	8	6	24	6	10	11	6	8	16	9	8	7	13	6	12	9	10	9	12	7	7	9	8	7	7	7	248
4	NS-400	11	6	10	27	10	17	2	15	14	19	7	6	24	3	9	7	7	7	16	20	11	8	14	9	9	9	19	316
14	R-400-3	14	16	13	8	12	7	18	12	7	6	16	15	2	20	14	18	16	11	7	6	12	14	15	12	14	13	8	326
12	R-100-4	8	10	9	26	8	12	14	11	11	20	11	10	15	15	8	16	12	12	13	17	8	9	13	10	8	8	13	327
31	C-WBI-400-1	13	15	11	10	13	13	15	14	12	4	12	13	9	18	16	15	11	16	8	8	15	13	16	14	15	15	10	344
26	C-R-400-2	15	14	14	12	14	8	16	17	10	7	18	14	6	19	15	19	17	17	11	11	10	15	18	13	13	14	11	368
19	C-G-100-1	21	23	15	2	20	24	12	7	15	3	10	22	17	5	21	4	10	13	12	7	24	17	3	22	23	22	12	386
3	NS-100	9	9	12	29	11	21	8	18	24	22	14	12	23	6	10	13	13	19	20	24	17	10	17	16	11	12	20	420
5	NS-1000	19	11	16	28	15	18	4	19	16	23	15	11	26	2	12	17	14	9	23	23	14	12	20	11	12	11	23	424
20	C-G-100-4	24	24	20	1	23	23	13	13	17	9	13	23	19	7	24	3	15	8	15	10	23	19	8	23	24	24	18	443
28	C-R-400-4	18	17	18	13	19	9	20	21	13	12	20	16	10	21	18	20	20	15	14	15	13	18	22	15	16	16	14	443
6	G-100-1	22	25	17	4	22	26	17	10	21	11	17	26	18	11	22	11	18	21	18	14	26	21	6	25	25	25	15	494
18	WBI-400-1	16	19	19	15	17	20	22	20	20	17	21	20	14	22	19	22	21	24	17	18	21	20	19	20	20	19	16	518
13	R-400-2	17	18	22	17	18	16	23	22	18	18	23	19	12	24	17	25	23	23	19	19	19	22	23	17	18	18	17	527
7	G-100-4	26	26	23	3	25	25	19	16	23	14	19	25	21	12	26	8	19	18	21	16	25	23	10	26	26	26	21	542
2	Coastal	10	13	21	30	16	22	21	23	26	26	22	18	25	16	13	21	22	26	25	26	22	16	21	21	17	17	25	561
15	R-400-4	20	20	24	16	21	15	25	24	19	21	24	21	16	25	20	26	24	22	22	21	18	24	24	18	19	20	22	571
29	C-R-1000-4	23	21	25	14	24	14	24	25	22	24	25	17	20	23	23	23	25	20	24	22	16	25	25	19	21	21	24	589
16	R-1000-4	25	22	26	18	26	19	26	26	25	25	26	24	22	27	25	29	26	25	26	25	20	26	26	24	22	23	26	660
21	C-G-400-4	28	28	27	6	27	27	27	27	27	27	27	27	27	26	28	24	27	27	27	27	27	27	27	27	27	27	27	707
8	G-400-4	29	29	28	9	28	29	28	28	28	28	28	29	28	28	29	28	28	29	28	28	29	28	28	28	29	28	28	745
22	C-G-1000-4	30	30	29	7	30	28	29	29	29	29	29	28	29	29	30	27	29	28	29	29	28	29	29	29	30	29	29	760
9	G-1000-4	31	31	30	11	31	30	30	30	30	30	30	30	30	30	31	30	30	30	30	30	30	30	30	30	31	31	30	797
1	No Action	27	27	31	31	29	31	31	31	31	31	31	31	31	31	27	31	31	31	31	31	31	31	31	31	28	30	31	819

Planning Unit 2
MCDA Trend Analysis (Ranked by Total Ranking Scores - All Respondants)

Rank	Scenario 1 Low RSLR High Employment Dispersed Population	Scenario 2 High RSLR High Employment Dispersed Population	Scenario 3 Low RSLR Business-as-Usual Compact Population	Scenario 4 High RSLR Business-as-Usual Compact Population
1	C-WBI-100-1	C-WBI-100-1	C-WBI-100-1	C-WBI-100-1
2	C-R-100-2	WBI-100-1	C-R-100-2	C-R-100-2
3	WBI-100-1	C-R-100-2	WBI-100-1	WBI-100-1
4	C-R-100-3	C-R-100-3	C-R-100-3	C-R-100-3
5	C-R-400-3	C-R-400-3	C-R-400-3	C-R-400-3
6	R-100-2	R-100-3	R-100-2	R-100-2
7	C-R-100-4	C-R-100-4	C-R-100-4	C-R-100-4
8	R-100-3	R-100-2	R-100-3	PU2-R-100-3
9	NS-400	NS-400	R-400-3	R-400-3
10	R-400-3	R-400-3	R-100-4	R-100-4
11	R-100-4	C-WBI-400-1	C-WBI-400-1	C-WBI-400-1
12	C-WBI-400-1	R-100-4	C-R-400-2	C-R-400-2
13	C-R-400-2	C-R-400-2	C-G-100-1	C-G-100-1
14	C-G-100-1	C-G-100-1	NS-100	C-G-100-4
15	NS-100	NS-1000	C-G-100-4	NS-100
16	NS-1000	NS-100	C-R-400-4	NS-1000
17	C-G-100-4	C-G-100-4	NS-1000	C-R-400-4
18	C-R-400-4	C-R-400-4	G-100-1	NS-400
19	G-100-1	G-100-1	R-400-2	G-100-1
20	WBI-400-1	WBI-400-1	WBI-400-1	R-400-2
21	R-400-2	R-400-2	NS-400	WBI-400-1
22	G-100-4	G-100-4	G-100-4	G-100-4
23	Coastal	Coastal	Coastal	Coastal
24	R-400-4	R-400-4	R-400-4	R-400-4
25	C-R-1000-4	C-R-1000-4	C-R-1000-4	C-R-1000-4
26	R-1000-4	R-1000-4	R-1000-4	R-1000-4
27	C-G-400-4	C-G-400-4	C-G-400-4	C-G-400-4
28	G-400-4	G-400-4	G-400-4	G-400-4
29	C-G-1000-4	C-G-1000-4	C-G-1000-4	C-G-1000-4
30	G-1000-4	G-1000-4	G-1000-4	G-1000-4
31	No Action	No Action	No Action	No Action

Planning Unit 2
Evaluation Criteria Values
(Scenario 1, Low Relative Sea Level Rise, High Employment, Dispersed Population; Low Uncertainty)

Plan #	Alternative	Stakeholder (Multi-Criteria Decision Analysis)	Minimizing Environmental Impacts		Investment Decision (Efficiency)			Minimizing Remaining Risk (Effectiveness)			Year 2025 Present Value Life Cycle Costs (2010-2075) ($Millions)
Evaluation Criteria		Cumulative Ranking Score from MCDA Trend Analysis	Direct Wetland Impact	Indirect Impacts	Cost Efficiency	Total System Costs	Period of Analysis Cost Efficiency	Annualized Residual Damages	Period of Analysis Risk Reduction	Average % Risk Reduction	
(Units)		(Unit-less Weight)	(Acres)	(Unit-less Scale)	Ratio: Risk Reduction / Present Value Life Cycle Costs (PV LCC)	Annualized Life Cycle Costs + EA Residual Damages ($Millions)	Cost Efficiency Ratio: Event Freq Risk Reduction X Probability of Occurrence (2010-2075) / PV LCC	Average Annual Remaining Risk ($Millions)	Event Freq Risk Reduction X Probability (2010-2075) ($Millions)	2075: 100-yr to 2,000-yr Frequency Events (Avg % of No Action Damages)	
2	Coastal	561	0	0	0.0765	1,786	1.29	44.7	20,199	26.51	15,657
3	NS-100	420	0	0	0.0760	1,866	1.16	30.0	23,148	30.80	19,920
4	NS-400	316	0	0	0.0583	1,935	1.08	15.3	33,818	79.20	31,419
5	NS-1000	424	0	0	0.0414	2,596	0.79	13.9	35,572	92.10	44,986
6	G-100-1	494	1,000	-8	0.0573	2,019	1.32	38.4	30,823	79.96	23,281
7	G-100-4	542	2,200	-8	0.0458	2,323	1.06	36.1	31,950	82.48	30,178
8	G-400-4	745	7,400	-8	0.0283	3,413	0.65	38.8	32,868	89.12	50,402
9	G-1000-4	797	9,500	-8	0.0229	3,800	0.57	38.8	32,899	89.45	57,992
10	R-100-2	225	700	4	0.0490	2,211	0.99	47.0	23,194	37.27	23,386
11	R-100-3	248	1,000	4	0.0454	2,311	0.92	45.9	23,684	38.13	25,803
12	R-100-4	327	1,600	4	0.0408	2,461	0.83	45.3	23,971	38.87	29,005
13	R-400-2	527	4,400	4	0.0304	3,013	0.74	42.3	30,241	72.53	41,068
14	R-400-3	326	4,700	4	0.0305	3,066	0.70	37.9	30,823	74.03	43,975
15	R-400-4	571	5,300	4	0.0273	3,285	0.66	40.6	31,173	75.12	47,123
16	R-1000-4	660	6,800	4	0.0236	3,670	0.59	40.2	32,131	87.01	54,831
17	WBI-100-1	113	0	2	0.0709	1,834	1.31	45.4	21,781	35.45	16,656
18	WBI-400-1	518	3,700	2	0.0359	2,678	0.84	43.6	28,568	69.26	33,951
19	C-G-100-1	386	1,000	-8	0.0582	1,976	1.25	29.2	32,923	83.93	26,315
20	C-G-100-4	443	2,200	-8	0.0474	2,282	1.03	28.2	33,870	85.87	32,737
21	C-G-400-4	707	7,400	-8	0.0288	3,335	0.67	29.8	35,549	94.49	52,704
22	C-G-1000-4	760	9,500	-8	0.0251	3,744	0.59	29.1	36,140	97.19	60,973
23	C-R-100-2	111	700	4	0.0502	2,187	0.95	37.9	25,484	41.09	26,756
24	C-R-100-3	138	1,000	4	0.0469	2,285	0.89	37.6	25,763	41.66	28,819
25	C-R-100-4	228	1,600	4	0.0425	2,436	0.81	37.4	25,938	42.24	31,843
26	C-R-400-2	368	4,400	4	0.0348	2,875	0.79	29.7	34,402	80.90	43,725
27	C-R-400-3	189	4,700	4	0.0342	2,946	0.74	26.5	34,534	81.54	46,485
28	C-R-400-4	443	5,300	4	0.0307	3,169	0.70	29.8	34,623	82.04	49,423
29	C-R-1000-4	589	6,800	4	0.0267	3,569	0.63	28.9	36,062	96.39	57,646
30	C-WBI-100-1	53	0	2	0.0683	1,804	1.18	34.2	24,698	39.73	20,874
31	C-WBI-400-1	344	3,700	2	0.0416	2,617	0.91	28.0	33,934	78.96	37,442

Planning Unit 2
Evaluation Criteria D rdinal Rankings
(Scenario 1, Low Relative Sea Level Rise, High Employment, Dispersed Population; Low Uncertainty)

Plan #	Alternative	Stakeholder /Multi-Criteria Decision Analysis)	Minimizing Environmental Impacts		Investment Decision (Efficiency)			Minimizing Remaining Risk (Effectiveness)				Year 2025 Present Value Life Cycle Costs (2010-2075) ($Millions)
Evaluation Criteria		Cumulative Ranking Score from MCDA Trend Analysis	Direct Wetland Impact	Indirect Impacts	Cost Efficiency	Total System Costs	Period of Analysis Cost Efficiency	Annualized Residual Damages	Period of Analysis Risk Reduction	Average % Risk Reduction		
	(Units)	(Unit-less Weight)	(Acres)	(Unit-less Scale)	Ratio: Risk Reduction / Present Value Life Cycle Costs (PV LCC)	Annualized Life Cycle Costs + EA Residual Damages ($Millions)	Cost Efficiency Ratio: Event Freq Risk Reduction X Probability of Occurrence (2010-2075) / PV LCC	Average Annual Remaining Risk (Millions)	Event Freq Risk Reduction X Probability (2010-2075) ($Millions)	2075: 100-yr to 2,000-yr Frequency Events (Avg % of No Action Damages)		
2	Coastal	23	2	20	1	2	3	26	30	30		1
3	NS-100	15	1	19	2	1	6	12	28	29		3
4	NS-400	9	5	21	5	5	7	2	10	15		13
5	NS-1000	16	6	22	16	17	18	1	3	4		21
6	G-100-1	19	10	24	7	7	1	19	18	14		5
7	G-100-4	22	16	26	12	13	8	14	15	10		12
8	G-400-4	28	28	28	27	26	26	21	13	6		25
9	G-1000-4	30	30	30	30	30	30	20	12	5		29
10	R-100-2	6	8	2	9	9	10	30	27	27		6
11	R-100-3	8	12	4	13	12	12	29	26	26		7
12	R-100-4	11	14	6	17	15	16	27	25	25		11
13	R-400-2	21	20	9	23	21	21	24	19	19		18
14	R-400-3	10	22	10	22	22	22	17	17	18		20
15	R-400-4	24	24	12	25	24	25	23	16	17		23
16	R-1000-4	26	26	14	29	28	29	22	14	7		27
17	WBI-100-1	3	4	16	3	4	2	28	29	28		2
18	WBI-400-1	20	18	18	18	18	15	25	20	20		16
19	C-G-100-1	14	9	23	6	6	4	8	11	9		8
20	C-G-100-4	17	15	25	10	10	9	5	9	8		15
21	C-G-400-4	27	27	27	24	25	24	10	4	3		26
22	C-G-1000-4	29	29	29	28	29	28	7	1	1		30
23	C-R-100-2	2	7	1	8	8	11	18	23	23		9
24	C-R-100-3	4	11	3	11	11	14	16	22	22		10
25	C-R-100-4	7	13	5	14	14	17	15	21	21		14
26	C-R-400-2	13	19	7	19	19	19	9	7	13		19
27	C-R-400-3	5	21	8	20	20	20	3	6	12		22
28	C-R-400-4	18	23	11	21	23	23	11	5	11		24
29	C-R-1000-4	25	25	13	26	27	27	6	2	2		28
30	C-WBI-100-1	1	3	15	4	3	5	13	24	24		4
31	C-WBI-400-1	12	17	17	15	16	13	4	8	16		17

Planning Unit 2

Cost Efficiency Analysis

(Scenario 1- LRSLR, High Employment, Dispersed Population; Low Uncertainty)

Plan #	Alternative	Present Value Life-Cycle Costs ($ Millions)	Risk Reduction Annual Equivalent ($ Millions)	Cost Efficiency Factor Risk Red / PV LCC	Rank
2	Coastal	15,657	1,197	0.0765	1
3	NS-100	19,920	1,514	0.0760	2
17	WBI-100-1	16,656	1,181	0.0709	3
30	C-WBI-100-1	20,874	1,425	0.0683	4
4	NS-400	31,419	1,832	0.0583	5
19	C-G-100-1	26,315	1,531	0.0582	6
6	G-100-1	23,261	1,333	0.0573	7
23	C-R-100-2	26,756	1,343	0.0502	8
10	R-100-2	23,386	1,147	0.0490	9
20	C-G-100-4	32,737	1,553	0.0474	10
24	C-R-100-3	28,819	1,350	0.0469	11
7	G-100-4	30,178	1,382	0.0458	12
11	R-100-3	25,803	1,171	0.0454	13
25	C-R-100-4	31,843	1,354	0.0425	14
31	C-WBI-400-1	37,442	1,559	0.0416	15
5	NS-1000	44,986	1,862	0.0414	16
12	R-100-4	29,005	1,184	0.0408	17
18	WBI-400-1	33,951	1,219	0.0359	18
26	C-R-400-2	43,725	1,521	0.0348	19
27	C-R-400-3	46,485	1,591	0.0342	20
28	C-R-400-4	49,423	1,518	0.0307	21
14	R-400-3	43,975	1,343	0.0305	22
13	R-400-2	41,066	1,248	0.0304	23
21	C-G-400-4	52,704	1,520	0.0288	24
15	R-400-4	47,123	1,285	0.0273	25
29	C-R-1000-4	57,646	1,538	0.0267	26
8	G-400-4	50,402	1,325	0.0263	27
22	C-G-1000-4	60,973	1,533	0.0251	28
16	R-1000-4	54,831	1,294	0.0236	29
9	G-1000-4	57,992	1,325	0.0229	30

Planning Unit 2

Cost Efficiency Rankings

Rank	Scenario 1 Low RSLR High Employment Dispersed Population	Scenario 2 High RSLR High Employment Dispersed Population	Scenario 3 Low RSLR Business-as-Usual Compact Population	Scenario 4 High RSLR Business-as-Usual Compact Population
1	Coastal	NS-100	NS-100	NS-100
2	NS-100	Coastal	Coastal	Coastal
3	WBI-100-1	WBI-100-1	C-WBI-100-1	C-WBI-100-1
4	C-WBI-100-1	C-WBI-100-1	WBI-100-1	WBI-100-1
5	NS-400	NS-400	C-G-100-1	C-G-100-1
6	C-G-100-1	C-G-100-1	G-100-1	G-100-1
7	G-100-1	G-100-1	C-R-100-2	C-R-100-2
8	C-R-100-2	C-R-100-2	C-G-100-4	C-G-100-4
9	R-100-2	R-100-2	C-R-100-3	C-R-100-3
10	C-G-100-4	C-G-100-4	R-100-2	R-100-2
11	C-R-100-3	C-R-100-3	G-100-4	G-100-4
12	G-100-4	G-100-4	R-100-3	R-100-3
13	R-100-3	R-100-3	C-R-100-4	C-R-100-4
14	C-R-100-4	C-R-100-4	NS-400	NS-400
15	C-WBI-400-1	NS-1000	NS-1000	NS-1000
16	NS-1000	C-WBI-400-1	C-WBI-400-1	C-WBI-400-1
17	R-100-4	R-100-4	R-100-4	R-100-4
18	WBI-400-1	WBI-400-1	WBI-400-1	WBI-400-1
19	C-R-400-2	C-R-400-2	C-R-400-2	C-R-400-2
20	C-R-400-3	C-R-400-3	C-R-400-3	C-R-400-3
21	C-R-400-4	C-R-400-4	C-R-400-4	C-R-400-4
22	R-400-3	R-400-3	R-400-3	R-400-3
23	R-400-2	R-400-2	R-400-2	R-400-2
24	C-G-400-4	C-G-400-4	C-G-400-4	C-G-400-4
25	R-400-4	R-400-4	R-400-4	R-400-4
26	C-R-1000-4	C-R-1000-4	C-R-1000-4	C-R-1000-4
27	G-400-4	G-400-4	G-400-4	G-400-4
28	C-G-1000-4	C-G-1000-4	C-G-1000-4	C-G-1000-4
29	R-1000-4	R-1000-4	R-1000-4	R-1000-4
30	G-1000-4	G-1000-4	G-1000-4	G-1000-4

Planning Unit 2

Total System Costs Analysis

(Scenario 1- LRSLR, High Employment, Dispersed Population; Low Uncertainty)

Plan #	Alternative	Annual Equivalent Life-Cycle Costs ($Millions)	With Project Residual Damages ($ Millions)	Total System Costs ($ Millions)	Rank
3	NS-100	1,017	649	1,666	1
2	Coastal	800	967	1,766	2
30	C-WBI-100-1	1,065	739	1,804	3
17	WBI-100-1	851	983	1,834	4
4	NS-400	1,603	332	1,935	5
19	C-G-100-1	1,343	633	1,976	6
6	G-100-1	1,188	831	2,019	7
23	C-R-100-2	1,366	821	2,187	8
10	R-100-2	1,194	1,017	2,211	9
20	C-G-100-4	1,671	611	2,282	10
24	C-R-100-3	1,471	814	2,285	11
11	R-100-3	1,318	993	2,311	12
7	G-100-4	1,541	782	2,323	13
25	C-R-100-4	1,626	810	2,436	14
12	R-100-4	1,481	980	2,461	15
31	C-WBI-400-1	1,912	605	2,517	16
5	NS-1000	2,294	302	2,596	17
18	WBI-400-1	1,734	944	2,678	18
26	C-R-400-2	2,233	642	2,875	19
27	C-R-400-3	2,373	573	2,946	20
13	R-400-2	2,097	916	3,013	21
14	R-400-3	2,246	821	3,066	22
28	C-R-400-4	2,523	645	3,169	23
15	R-400-4	2,406	879	3,285	24
21	C-G-400-4	2,691	644	3,335	25
8	G-400-4	2,574	839	3,413	26
29	C-R-1000-4	2,943	626	3,569	27
16	R-1000-4	2,800	870	3,670	28
22	C-G-1000-4	3,113	630	3,744	29
9	G-1000-4	2,961	839	3,800	30

Planning Unit 2

Total System Costs Rankings

Rank	Scenario 1 Low RSLR High Employment Dispersed Population	Scenario 2 High RSLR High Employment Dispersed Population	Scenario 3 Low RSLR Business-as-Usual Compact Population	Scenario 4 High RSLR Business-as-Usual Compact Population
1	NS-100	NS-100	NS-100	NS-100
2	Coastal	Coastal	Coastal	Coastal
3	C-WBI-100-1	C-WBI-100-1	C-WBI-100-1	C-WBI-100-1
4	WBI-100-1	WBI-100-1	WBI-100-1	WBI-100-1
5	NS-400	NS-400	C-G-100-1	C-G-100-1
6	C-G-100-1	C-G-100-1	G-100-1	G-100-1
7	G-100-1	G-100-1	C-R-100-2	C-R-100-2
8	C-R-100-2	C-R-100-2	R-100-2	R-100-2
9	R-100-2	R-100-2	C-R-100-3	C-R-100-3
10	C-G-100-4	C-G-100-4	C-G-100-4	C-G-100-4
11	C-R-100-3	C-R-100-3	R-100-3	R-100-3
12	R-100-3	R-100-3	G-100-4	G-100-4
13	G-100-4	G-100-4	C-R-100-4	C-R-100-4
14	C-R-100-4	C-R-100-4	R-100-4	R-100-4
15	R-100-4	R-100-4	NS-400	NS-400
16	C-WBI-400-1	C-WBI-400-1	C-WBI-400-1	C-WBI-400-1
17	NS-1000	NS-1000	WBI-400-1	NS-1000
18	WBI-400-1	WBI-400-1	NS-1000	WBI-400-1
19	C-R-400-2	C-R-400-2	C-R-400-2	C-R-400-2
20	C-R-400-3	C-R-400-3	R-400-2	C-R-400-3
21	R-400-2	R-400-2	C-R-400-3	R-400-2
22	R-400-3	R-400-3	R-400-3	R-400-3
23	C-R-400-4	C-R-400-4	C-R-400-4	C-R-400-4
24	R-400-4	R-400-4	R-400-4	R-400-4
25	C-G-400-4	C-G-400-4	C-G-400-4	C-G-400-4
26	G-400-4	G-400-4	G-400-4	G-400-4
27	C-R-1000-4	C-R-1000-4	C-R-1000-4	C-R-1000-4
28	R-1000-4	R-1000-4	R-1000-4	R-1000-4
29	C-G-1000-4	C-G-1000-4	C-G-1000-4	C-G-1000-4
30	G-1000-4	G-1000-4	G-1000-4	G-1000-4

Planning Unit 2

Period of Analysis Cost Efficiency

(2075 Risk Reduction X Probability (2010-2075) / Present Value Costs For Frequency Events Included in Economic Evaluation)

(Scenario 1: Low RSLR, High Employment, Dispersed Population - Low Uncertainty)

Plan #	Alternative	Remaining Damages by Frequency ($ Billions)					Total Risk Reduction X Probabilty 2010-2075 ($ Billions)	Present Value - Life-Cycle Costs ($ Billions)	Cost Efficiency Ratio - Total Risk Reduction / PV Costs	Rank
		10-yr	100-yr	400-yr	1000-yr	2000-yr				
No Action Damages ($ Billions)		1.6	46.7	51.7	53.2	54.0				
6	G-100-1	1.5	4.3	8.5	13.6	15.6	30.6	23.3	1.32	1
17	WBI-100-1	1.8	6.1	40.3	44.1	45.4	21.8	16.7	1.31	2
2	Coastal	1.8	6.1	46.9	50.3	51.6	20.2	15.7	1.29	3
19	C-G-100-1	0.7	2.1	6.5	11.7	13.6	32.9	26.3	1.25	4
30	C-WBI-100-1	0.6	3.5	38.1	42.2	43.5	24.7	20.9	1.18	5
3	NS-100	0.6	3.5	44.8	48.3	49.6	23.1	19.9	1.16	6
4	NS-400	0.3	0.5	5.5	13.5	24.9	33.8	31.4	1.08	7
7	G-100-4	1.0	3.2	7.5	12.2	13.9	32.0	30.2	1.06	8
20	C-G-100-4	0.3	1.4	5.8	10.5	12.2	33.9	32.7	1.03	9
10	R-100-2	1.2	4.9	39.5	43.3	44.5	23.2	23.4	0.99	10
23	C-R-100-2	0.4	2.8	37.6	41.5	42.7	25.5	26.8	0.95	11
11	R-100-3	1.0	4.4	39.0	43.0	44.1	23.7	25.8	0.92	12
31	C-WBI-400-1	0.4	0.6	3.9	10.7	29.8	33.9	37.4	0.91	13
24	C-R-100-3	0.3	2.5	37.2	41.2	42.4	25.8	28.8	0.89	14
18	WBI-400-1	1.8	6.1	9.8	15.0	33.8	28.6	34.0	0.84	15
12	R-100-4	1.0	4.1	38.7	42.5	43.6	24.0	29.0	0.83	16
25	C-R-100-4	0.3	2.3	37.0	40.9	41.9	25.9	31.8	0.81	17
5	NS-1000	0.2	0.3	1.9	4.7	9.9	35.6	45.0	0.79	18
26	C-R-400-2	0.2	0.5	2.9	9.1	28.4	34.4	43.7	0.79	19
27	C-R-400-3	0.2	0.4	2.6	8.7	27.8	34.5	46.5	0.74	20
13	R-400-2	1.2	4.9	8.0	13.0	32.1	30.2	41.1	0.74	21
14	R-400-3	1.0	4.4	7.2	12.2	31.1	30.8	44.0	0.70	22
28	C-R-400-4	0.2	0.4	2.4	8.3	27.4	34.6	49.4	0.70	23
21	C-G-400-4	0.3	0.5	2.2	3.9	5.0	35.5	52.7	0.67	24
15	R-400-4	1.0	4.1	6.6	11.5	30.4	31.2	47.1	0.66	25
8	G-400-4	1.0	3.2	5.1	6.6	7.7	32.9	50.4	0.65	26
29	C-R-1000-4	0.2	0.3	0.7	2.3	4.4	36.1	57.6	0.63	27
22	C-G-1000-4	0.2	0.3	0.7	1.9	3.1	36.1	61.0	0.59	28
16	R-1000-4	1.0	4.1	6.5	7.3	9.0	32.1	54.8	0.59	29
9	G-1000-4	1.0	3.2	5.1	6.4	7.2	32.9	58.0	0.57	30

Planning Unit 2

Period of Analysis Cost Efficiency Rankings

(2075 Risk Reduction X Probability (2010 - 2075) / Present Value Costs Rankings For Frequency Events Included in Economic Evaluation)

Rank	Scenario 1 Low RSLR High Employment Dispersed Population	Scenario 2 High RSLR High Employment Dispersed Population	Scenario 3 Low RSLR Business-as-Usual Compact Population	Scenario 4 High RSLR Business-as-Usual Compact Population
1	G-100-1	G-100-1	G-100-1	G-100-1
2	WBI-100-1	WBI-100-1	Coastal	Coastal
3	Coastal	Coastal	WBI-100-1	C-G-100-1
4	C-G-100-1	C-G-100-1	C-G-100-1	WBI-100-1
5	C-WBI-100-1	C-WBI-100-1	NS-100	NS-100
6	NS-100	NS-100	C-WBI-100-1	C-WBI-100-1
7	NS-400	NS-400	G-100-4	G-100-4
8	G-100-4	G-100-4	C-G-100-4	C-G-100-4
9	C-G-100-4	C-G-100-4	R-100-2	R-100-2
10	R-100-2	R-100-2	C-R-100-2	C-R-100-2
11	C-R-100-2	C-R-100-2	R-100-3	R-100-3
12	R-100-3	R-100-3	C-R-100-3	C-R-100-3
13	C-WBI-400-1	C-WBI-400-1	C-WBI-400-1	C-WBI-400-1
14	C-R-100-3	C-R-100-3	WBI-400-1	R-100-4
15	WBI-400-1	R-100-4	R-100-4	C-R-100-4
16	R-100-4	C-R-100-4	C-R-100-4	WBI-400-1
17	C-R-100-4	WBI-400-1	NS-400	NS-1000
18	NS-1000	NS-1000	NS-1000	NS-400
19	C-R-400-2	C-R-400-2	C-R-400-2	C-R-400-2
20	C-R-400-3	C-R-400-3	R-400-2	R-400-2
21	R-400-2	R-400-2	C-R-400-3	C-R-400-3
22	R-400-3	C-R-400-4	R-400-3	R-400-3
23	C-R-400-4	R-400-3	C-R-400-4	C-R-400-4
24	C-G-400-4	C-G-400-4	C-G-400-4	C-G-400-4
25	R-400-4	G-400-4	R-400-4	R-400-4
26	G-400-4	R-400-4	G-400-4	G-400-4
27	C-R-1000-4	C-R-1000-4	C-R-1000-4	C-R-1000-4
28	C-G-1000-4	C-G-1000-4	R-1000-4	C-G-1000-4
29	R-1000-4	R-1000-4	C-G-1000-4	R-1000-4
30	G-1000-4	G-1000-4	G-1000-4	G-1000-4

Planning Unit 2

Residual Damages (Remaining Risk) Analysis

(Scenario 1: Low RSLR, High Employment, Dispersed Population - Low Uncertainty)

Plan #	Alternative	No Action Residual Damages ($Millions)	With Project Residual Damages ($ Millions)	% of No Action Damages	Rank
5	NS-1000	2,164	302	13.9	1
4	NS-400	2,164	332	15.3	2
27	C-R-400-3	2,164	573	26.5	3
31	C-WBI-400-1	2,164	605	28.0	4
20	C-G-100-4	2,164	611	28.2	5
29	C-R-1000-4	2,164	626	28.9	6
22	C-G-1000-4	2,164	630	29.1	7
19	C-G-100-1	2,164	633	29.2	8
26	C-R-400-2	2,164	642	29.7	9
21	C-G-400-4	2,164	644	29.8	10
28	C-R-400-4	2,164	645	29.8	11
3	NS-100	2,164	649	30.0	12
30	C-WBI-100-1	2,164	739	34.2	13
7	G-100-4	2,164	782	36.1	14
25	C-R-100-4	2,164	810	37.4	15
24	C-R-100-3	2,164	814	37.6	16
14	R-400-3	2,164	821	37.9	17
23	C-R-100-2	2,164	821	37.9	18
6	G-100-1	2,164	831	38.4	19
9	G-1000-4	2,164	839	38.8	20
8	G-400-4	2,164	839	38.8	21
16	R-1000-4	2,164	870	40.2	22
15	R-400-4	2,164	879	40.6	23
13	R-400-2	2,164	916	42.3	24
18	WBI-400-1	2,164	944	43.6	25
2	Coastal	2,164	967	44.7	26
12	R-100-4	2,164	980	45.3	27
17	WBI-100-1	2,164	983	45.4	28
11	R-100-3	2,164	993	45.9	29
10	R-100-2	2,164	1,017	47.0	30

Planning Unit 2

Residual Damages (Remaining Risk) Rankings

Rank	Scenario 1 Low RSLR High Employment Dispersed Population	Scenario 2 High RSLR High Employment Dispersed Population	Scenario 3 Low RSLR Business-as-Usual Compact Population	Scenario 4 High RSLR Business-as-Usual Compact Population
1	NS-1000	NS-1000	NS-1000	NS-1000
2	NS-400	NS-400	NS-400	NS-400
3	C-R-400-3	C-R-400-3	C-R-400-3	C-R-400-3
4	C-WBI-400-1	C-G-100-4	C-WBI-400-1	C-WBI-400-1
5	C-G-100-4	C-R-1000-4	C-G-100-4	C-G-100-4
6	C-R-1000-4	C-WBI-400-1	C-R-1000-4	C-R-1000-4
7	C-G-1000-4	C-G-1000-4	C-G-1000-4	C-G-1000-4
8	C-G-100-1	C-G-400-4	C-G-100-1	C-G-400-4
9	C-R-400-2	C-R-400-4	C-R-400-2	C-R-400-2
10	C-G-400-4	C-R-400-2	C-G-400-4	C-R-400-4
11	C-R-400-4	C-G-100-1	C-R-400-4	C-G-100-1
12	NS-100	NS-100	NS-100	NS-100
13	C-WBI-100-1	G-100-4	C-WBI-100-1	C-WBI-100-1
14	G-100-4	C-WBI-100-1	C-R-100-4	C-R-100-4
15	C-R-100-4	C-R-100-4	C-R-100-3	G-100-4
16	C-R-100-3	C-R-100-3	C-R-100-2	C-R-100-3
17	R-400-3	R-400-3	G-100-4	C-R-100-2
18	C-R-100-2	G-1000-4	R-400-3	R-400-3
19	G-100-1	G-400-4	G-1000-4	G-1000-4
20	G-1000-4	C-R-100-2	G-400-4	G-400-4
21	G-400-4	G-100-1	G-100-1	G-100-1
22	R-1000-4	R-1000-4	R-1000-4	R-1000-4
23	R-400-4	R-400-4	R-400-4	R-400-4
24	R-400-2	R-400-2	R-400-2	R-400-2
25	WBI-400-1	WBI-400-1	WBI-400-1	WBI-400-1
26	Coastal	R-100-4	Coastal	R-100-4
27	R-100-4	R-100-3	R-100-4	R-100-3
28	WBI-100-1	Coastal	R-100-3	Coastal
29	R-100-3	WBI-100-1	WBI-100-1	R-100-2
30	R-100-2	R-100-2	R-100-2	WBI-100-1

Planning Unit 2

Period of Analysis Risk Reduction

(2075 Risk Reduction X Probability (2010-2075)

For Frequency Events Included in Economic Evaluation)

(Scenario 1: Low RSLR, High Employment, Dispersed Population - Low Uncertainty)

Plan #	Alternative	Remaining Damages by Frequency ($Millions)					Total Risk Reduction X Probability 2010-2075 ($Million)	Rank
		10-yr	100-yr	400-yr	1,000-yr	2,000-yr		
No Action Damages ($ Million)		1,583	46,652	51,671	53,208	53,965		
22	C-G-1000-4	185	323	651	1,926	3,063	36,140	1
29	C-R-1000-4	190	336	666	2,264	4,415	36,062	2
5	NS-1000	155	349	1,950	4,675	9,862	35,572	3
21	C-G-400-4	260	522	2,201	3,927	5,011	35,549	4
28	C-R-400-4	218	416	2,390	8,294	27,377	34,623	5
27	C-R-400-3	226	444	2,584	8,675	27,832	34,534	6
26	C-R-400-2	249	486	2,859	9,147	28,398	34,402	7
31	C-WBI-400-1	351	629	3,900	10,662	29,791	33,934	8
20	C-G-100-4	336	1,396	5,785	10,537	12,167	33,870	9
4	NS-400	256	517	5,548	13,451	24,867	33,818	10
19	C-G-100-1	702	2,148	6,471	11,684	13,601	32,923	11
9	G-1000-4	959	3,208	5,103	6,424	7,228	32,899	12
8	G-400-4	959	3,208	5,118	6,641	7,692	32,868	13
16	R-1000-4	956	4,126	6,541	7,328	8,995	32,131	14
7	G-100-4	959	3,227	7,521	12,199	13,855	31,950	15
15	R-400-4	956	4,126	6,628	11,468	30,382	31,173	16
14	R-400-3	1,012	4,431	7,165	12,156	31,126	30,823	17
6	G-100-1	1,477	4,303	8,510	13,630	15,564	30,623	18
13	R-400-2	1,155	4,916	7,969	13,049	32,054	30,241	19
18	WBI-400-1	1,805	6,097	9,802	15,047	33,812	28,568	20
25	C-R-100-4	288	2,293	36,990	40,879	41,942	25,938	21
24	C-R-100-3	309	2,475	37,178	41,243	42,415	25,763	22
23	C-R-100-2	361	2,783	37,566	41,457	42,668	25,484	23
30	C-WBI-100-1	650	3,493	38,149	42,170	43,451	24,698	24
12	R-100-4	956	4,136	38,704	42,529	43,620	23,971	25
11	R-100-3	1,012	4,440	38,985	42,957	44,131	23,684	26
10	R-100-2	1,155	4,924	39,518	43,310	44,520	23,194	27
3	NS-100	629	3,483	44,758	48,282	49,627	23,148	28
17	WBI-100-1	1,805	6,102	40,302	44,147	45,405	21,781	29
2	Coastal	1,805	6,117	46,912	50,259	51,581	20,199	30

Planning Unit 2

Period of Analysis Risk Reduction Rankings

(2075 Risk Reduction X Probability (2010 - 2075) Rankings
For Frequency Events Included in Economic Evaluation)

Rank	Scenario 1 Low RSLR High Employment Dispersed Population	Scenario 2 High RSLR High Employment Dispersed Population	Scenario 3 Low RSLR Business-as-Usual Compact Population	Scenario 4 High RSLR Business-as-Usual Compact Population
1	C-G-1000-4	C-G-1000-4	C-G-1000-4	C-G-1000-4
2	C-R-1000-4	C-R-1000-4	C-R-1000-4	C-R-1000-4
3	NS-1000	NS-1000	C-G-400-4	C-G-400-4
4	C-G-400-4	C-G-400-4	NS-1000	NS-1000
5	C-R-400-4	C-R-400-4	C-R-400-4	C-R-400-4
6	C-R-400-3	C-R-400-3	C-R-400-3	C-R-400-3
7	C-R-400-2	C-R-400-2	C-R-400-2	C-R-400-2
8	C-WBI-400-1	C-G-100-4	C-G-100-4	C-G-100-4
9	C-G-100-4	C-WBI-400-1	NS-400	NS-400
10	NS-400	NS-400	C-WBI-400-1	C-WBI-400-1
11	C-G-100-1	G-1000-4	C-G-100-1	G-1000-4
12	G-1000-4	G-400-4	G-1000-4	G-400-4
13	G-400-4	C-G-100-1	G-400-4	R-1000-4
14	R-1000-4	G-100-4	R-1000-4	C-G-100-1
15	G-100-4	R-1000-4	G-100-4	G-100-4
16	R-400-4	R-400-4	R-400-4	R-400-4
17	R-400-3	R-400-3	R-400-3	R-400-3
18	G-100-1	G-100-1	R-400-2	R-400-2
19	R-400-2	R-400-2	G-100-1	G-100-1
20	WBI-400-1	WBI-400-1	WBI-400-1	WBI-400-1
21	C-R-100-4	C-R-100-4	C-R-100-4	C-R-100-4
22	C-R-100-3	C-R-100-3	C-R-100-3	C-R-100-3
23	C-R-100-2	C-R-100-2	C-R-100-2	C-R-100-2
24	C-WBI-100-1	R-100-4	C-WBI-100-1	R-100-4
25	R-100-4	C-WBI-100-1	R-100-4	C-WBI-100-1
26	R-100-3	R-100-3	NS-100	R-100-3
27	R-100-2	R-100-2	R-100-3	NS-100
28	NS-100	NS-100	R-100-2	R-100-2
29	WBI-100-1	WBI-100-1	WBI-100-1	WBI-100-1
30	Coastal	Coastal	Coastal	Coastal

Planning Unit 2

Average % Risk Reduction of Total Damages

For 100-yr to 2,000-yr Frequency Event Range Based on 2075 Population / Land Use

(Scenario 1: Low RSLR, High Employment, Dispersed Population - 90% Confidence Level)

Plan #	Alternative	Average % Risk Reduction for 100-yr to 2,000-yr Frequency Events	Average Risk Reduction for 100-yr to 2,000-yr Frequency Events ($ Millions)	Life Cycle Costs Equiv. Annual ($ Millions)	Rank
Total No Action Residual Damages 100-yr to 2,000-yr Freq Events ($ Million)		205,496			
22	C-G-1000-4	97.19	199,717	3,113	1
29	C-R-1000-4	96.39	198,075	2,943	2
21	C-G-400-4	94.49	194,171	2,691	3
5	NS-1000	92.10	189,270	2,294	4
9	G-1000-4	89.45	183,806	2,961	5
8	G-400-4	89.12	183,139	2,574	6
16	R-1000-4	87.01	178,810	2,800	7
20	C-G-100-4	85.87	176,450	1,671	8
19	C-G-100-1	83.93	172,467	1,343	9
7	G-100-4	82.48	169,496	1,541	10
28	C-R-400-4	82.04	168,591	2,523	11
27	C-R-400-3	81.54	167,565	2,373	12
26	C-R-400-2	80.90	166,253	2,233	13
6	G-100-1	79.96	164,319	1,188	14
4	NS-400	79.20	162,750	1,603	15
31	C-WBI-400-1	78.96	162,269	1,912	16
15	R-400-4	75.12	154,366	2,406	17
14	R-400-3	74.03	152,124	2,246	18
13	R-400-2	72.53	149,046	2,097	19
18	WBI-400-1	69.26	142,320	1,734	20
25	C-R-100-4	42.24	86,795	1,626	21
24	C-R-100-3	41.66	85,605	1,471	22
23	C-R-100-2	41.09	84,433	1,366	23
30	C-WBI-100-1	39.73	81,638	1,065	24
12	R-100-4	38.87	79,871	1,481	25
11	R-100-3	38.13	78,357	1,318	26
10	R-100-2	37.27	76,583	1,194	27
17	WBI-100-1	35.45	72,855	851	28
3	NS-100	30.80	63,297	1,017	29
2	Coastal	26.51	54,486	800	30

Planning Unit 2

Average % Risk Reduction of Total Damages Rankings

For 100-yr to 2,000-yr Frequency Event Range Based on 2075 Population / Land Use

Rank	Scenario 1 Low RSLR High Employment Dispersed Population	Scenario 2 High RSLR High Employment Dispersed Population	Scenario 3 Low RSLR Business-as-Usual Compact Population	Scenario 4 High RSLR Business-as-Usual Compact Population
1	C-G-1000-4	C-G-1000-4	C-G-1000-4	C-G-1000-4
2	C-R-1000-4	C-R-1000-4	C-R-1000-4	C-R-1000-4
3	C-G-400-4	C-G-400-4	C-G-400-4	C-G-400-4
4	NS-1000	NS-1000	NS-1000	G-1000-4
5	G-1000-4	G-1000-4	G-1000-4	G-400-4
6	G-400-4	G-400-4	G-400-4	NS-1000
7	R-1000-4	R-1000-4	R-1000-4	R-1000-4
8	C-G-100-4	C-G-100-4	C-G-100-4	C-G-100-4
9	C-G-100-1	C-G-100-1	C-G-100-1	C-G-100-1
10	G-100-4	G-100-4	G-100-4	G-100-4
11	C-R-400-4	C-R-400-4	C-R-400-4	C-R-400-4
12	C-R-400-3	C-R-400-3	G-100-1	G-100-1
13	C-R-400-2	C-R-400-2	C-R-400-3	C-R-400-3
14	G-100-1	G-100-1	C-R-400-2	C-R-400-2
15	NS-400	NS-400	NS-400	NS-400
16	C-WBI-400-1	C-WBI-400-1	C-WBI-400-1	C-WBI-400-1
17	R-400-4	R-400-4	R-400-4	R-400-4
18	R-400-3	R-400-3	R-400-3	R-400-3
19	R-400-2	R-400-2	R-400-2	R-400-2
20	WBI-400-1	WBI-400-1	WBI-400-1	WBI-400-1
21	C-R-100-4	C-R-100-4	C-R-100-4	C-R-100-4
22	C-R-100-3	C-R-100-3	C-R-100-3	C-R-100-3
23	C-R-100-2	C-R-100-2	C-R-100-2	C-R-100-2
24	C-WBI-100-1	R-100-4	C-WBI-100-1	R-100-4
25	R-100-4	C-WBI-100-1	R-100-4	C-WBI-100-1
26	R-100-3	R-100-3	R-100-3	R-100-3
27	R-100-2	R-100-2	R-100-2	R-100-2
28	WBI-100-1	WBI-100-1	WBI-100-1	WBI-100-1
29	NS-100	NS-100	NS-100	NS-100
30	Coastal	Coastal	Coastal	Coastal

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Planning Unit 3a

Sample Data Rankings and Evaluation Criteria Tables

Planning Unit 3a - Metric Data Summary

(Scenario 1 - Low Relative Sea Level Rise, High Employment, Dispersed Population; Low Uncertainty)

Plan #	Alternative	Population Impacted	Residual Damages	Life Cycle Cost 1/	Construction Time	Employment Impacted	Indirect Environmental Impact Score	Direct Wetland Impacts	Historic Properties Protected	Historic Districts Protected	Archeo. Sites Protected
		Equiv. Annual #	Equiv. Annual $ Millions	Equiv. Annual $ Millions	Years	Equiv. Annual #	Unit-less Scale -8 to +8	Acres	# Properties	# Districts	# Sites
1	No Action	19,069	1,028	0	15	5,462	0	0	0	0	72
2	Coastal	19,115	1,027	1,189	15	5,451	0	0	3	0	111
3	NS-100	17,559	512	1,587	15	3,078	0	0	3	0	111
4	NS-400	15,858	365	1,733	15	1,805	0	0	3	0	111
5	NS-1000	14,544	330	1,786	15	1,457	0	0	3	0	111
6	M-100-1	9,106	474	2,282	10	2,444	-7	4,900	13	0	157
7	M-100-2	9,937	537	2,158	10	2,606	-4	4,200	10	0	128
8	G-400-2	9,659	514	2,476	10	2,489	-7	5,300	5	1	128
9	G-1000-2	9,493	506	2,599	10	2,442	-7	6,600	16	1	128
10	C-M-100-1	9,095	426	2,314	10	2,332	-7	4,900	13	0	157
11	C-M-100-2	9,925	483	2,193	10	2,490	-4	4,200	10	0	128
12	C-G-400-2	9,429	434	2,553	10	1,938	-7	5,300	5	1	128
13	C-G-1000-2	9,168	415	2,727	10	1,871	-7	6,600	16	1	128

1/ Equivalent Annual Costs shown include costs for construction of coastal landscape measures. The final array of alternatives, as presented elsewhere in the report, do not include these costs since sustaining the current coastal landscape in this area appears to provide minimal contribution, if any, to reduction of risk from hurricane surge. Since deleting the coastal landscape costs affects all alternatives equally, the relative ranking of alternatives remains the same.

Planning Unit 3a - Relative Ranking of Alternatives Based On Individual Metrics

(Scenario 1 - Low Relative Sea Level Rise, High Employment, Dispersed Population; Low Uncertainty)

Rank	Population Impacted	Residual Damages	Life Cycle Cost	Construction Time	Employment Impacted	Indirect Environmental Impact Score	Direct Wetland Impacts	Historic Properties Protected	Historic Districts Protected	Archeo. Sites Protected
1	C-M-100-1	NS-1000	No Action	M-100-2	NS-1000	No Action	No Action	G-1000-2	G-400-2	M-100-1
2	M-100-1	NS-400	Coastal	C-M-100-2	NS-400	Coastal	Coastal	C-G-1000-2	C-G-400-2	C-M-100-1
3	C-G-1000-2	C-G-1000-2	NS-100	M-100-1	C-G-1000-2	NS-100	NS-100	M-100-1	G-1000-2	M-100-2
4	C-G-400-2	C-M-100-1	NS-400	C-M-100-1	C-G-400-2	NS-400	NS-400	C-M-100-1	C-G-1000-2	C-M-100-2
5	G-1000-2	C-G-400-2	NS-1000	G-400-2	C-M-100-1	NS-1000	NS-1000	M-100-2	No Action	G-400-2
6	G-400-2	M-100-1	M-100-2	C-G-400-2	G-1000-2	M-100-2	M-100-2	C-M-100-2	Coastal	C-G-400-2
7	C-M-100-2	C-M-100-2	C-M-100-2	G-1000-2	M-100-1	C-M-100-2	C-M-100-2	G-400-2	NS-100	G-1000-2
8	M-100-2	G-1000-2	M-100-1	C-G-1000-2	G-400-2	M-100-1	M-100-1	C-G-400-2	NS-400	C-G-1000-2
9	NS-1000	NS-100	C-M-100-1	No Action	C-M-100-2	C-M-100-1	C-M-100-1	Coastal	NS-1000	Coastal
10	NS-400	G-400-2	G-400-2	Coastal	M-100-2	G-400-2	G-400-2	NS-100	M-100-2	NS-100
11	NS-100	M-100-2	C-G-400-2	NS-100	NS-100	C-G-400-2	C-G-400-2	NS-400	C-M-100-2	NS-400
12	No Action	Coastal	G-1000-2	NS-400	Coastal	G-1000-2	G-1000-2	NS-1000	M-100-1	NS-1000
13	Coastal	No Action	C-G-1000-2	NS-1000	No Action	C-G-1000-2	C-G-1000-2	No Action	C-M-100-1	No Action

Planning Unit 3a - Multi-Criteria Decision Analysis (MCDA) Trend Analysis

(Scenario 1 - Low Relative Sea Level Rise, High Employment, Dispersed Population; Low Uncertainty)

Plan #	Alternative	Plan Rank By Each Respondant																													Total Ranking Score (All Respondants)
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
5	NS-1000	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	5	1	1	9	1	8	1	1	50
4	NS-400	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	7	3	4	2	2	10	2	10	2	2	84
3	NS-100	3	3	5	3	3	3	5	3	3	5	3	3	3	3	3	3	3	3	3	3	11	4	2	3	9	11	3	11	3	3	126
11	C-M-100-2	6	4	3	4	6	4	3	4	4	3	4	4	4	6	4	5	4	4	4	4	4	6	6	4	4	6	5	4	6	5	134
7	M-100-2	7	5	4	5	7	5	4	5	5	4	5	5	5	7	5	7	5	5	5	5	6	7	7	5	6	7	6	7	7	6	169
10	C-M-100-1	8	6	6	6	8	6	6	7	7	6	6	6	8	8	6	8	6	7	7	7	5	8	8	6	3	2	7	2	8	7	191
6	M-100-1	9	7	7	7	9	7	7	8	8	7	7	7	9	9	7	9	8	8	8	8	10	9	9	7	5	4	9	3	9	8	229
2	Coastal	5	8	12	12	4	12	12	6	6	12	12	10	6	4	12	4	12	6	6	6	12	5	3	12	12	12	4	12	5	4	248
12	C-G-400-2	10	10	8	8	10	9	8	9	9	8	9	9	10	10	9	10	9	9	9	9	2	10	11	8	7	3	10	6	10	10	259
13	C-G-1000-2	12	9	9	10	12	8	9	10	11	9	8	8	12	12	8	12	7	11	11	11	3	13	13	9	8	1	12	1	12	11	282
1	No Action	4	13	13	13	5	13	13	11	13	13	13	13	7	5	13	6	13	12	10	12	13	1	1	13	13	13	8	13	4	9	303
8	G-400-2	11	11	10	9	11	11	10	12	10	10	11	12	11	11	11	11	11	10	12	10	8	11	10	10	10	8	11	9	11	12	315
9	G-1000-2	13	12	11	11	13	10	11	13	12	11	10	11	13	13	10	13	10	13	13	13	9	12	12	11	11	5	13	5	13	13	340

Planning Unit 3a

MCDA Trend Analysis (Ranked by Total Ranking Scores - All Respondants)

Rank	Scenario 1 Low RSLR High Employment Dispersed Population	Scenario 2 High RSLR High Employment Dispersed Population	Scenario 3 Low RSLR Business-as-Usual Compact Population	Scenario 4 High RSLR Business-as-Usual Compact Population
1	NS-1000	NS-1000	NS-1000	NS-1000
2	NS-400	NS-400	NS-400	NS-400
3	NS-100	C-M-100-2	NS-100	NS-100
4	C-M-100-2	NS-100	C-M-100-2	C-M-100-2
5	M-100-2	M-100-2	M-100-2	M-100-2
6	C-M-100-1	C-M-100-1	C-M-100-1	C-M-100-1
7	M-100-1	M-100-1	M-100-1	M-100-1
8	Coastal	C-G-400-2	Coastal	Coastal
9	C-G-400-2	C-G-1000-2	C-G-400-2	C-G-400-2
10	C-G-1000-2	Coastal	C-G-1000-2	C-G-1000-2
11	No Action	G-400-2	No Action	No Action
12	G-400-2	No Action	G-400-2	G-400-2
13	G-1000-2	G-1000-2	G-1000-2	G-1000-2

Planning Unit 3a

Evaluation Criteria Values

(Scenario 1, Low Relative Sea Level Rise, High Employment, Dispersed Population; Low Uncertainty)

Plan #	Alternative	Stakeholder (Multi-Criteria Decision Analysis)	Minimizing Environmental Impacts		Investment Decision (Efficiency) 1/			Minimizing Remaining Risk (Effectiveness)			Year 2025 Present Value Life Cycle Costs (2010-2075) ($Millions) 1/
Evaluation Criteria		Cumulative Ranking Score from MCDA Trend Analysis	Direct Wetland Impact	Indirect Impacts	Cost Efficiency	Total System Costs	Period of Analysis Cost Efficiency	Annualized Residual Damages	Period of Analysis Risk Reduction	Average % Risk Reduction	
(Units)		(Unit-less Weight)	(Acres)	(Unit-less Scale)	Ratio: Risk Reduction / Present Value Life Cycle Costs (PV LCC)	Annualized Life Cycle Costs + EA Residual Damages ($Millions)	Cost Efficiency Ratio: Event Freq Risk Reduction X Probability of Occurrence (2010-2075) / PV LCC	Average Annual Remaining Risk (Millions)	Event Freq Risk Reduction X Probability (2010-2075) ($Millions)	2075: 100-yr to 2,000-yr Frequency Events (Avg % of No Action Damages)	
2	Coastal	248	0	0	0.0000	2,216	-0.0003	99.9	-6	-0.20	23,276
3	NS-100	126	0	0	0.0166	2,099	0.1362	49.8	4,235	15.79	31,102
4	NS-400	84	0	0	0.0195	2,098	0.2543	35.5	8,634	49.33	33,959
5	NS-1000	50	0	0	0.0199	2,116	0.3041	32.1	10,644	72.92	34,999
6	M-100-1	229	4,900	-7	0.0124	2,756	0.2214	46.1	9,894	63.88	44,688
7	M-100-2	169	4,200	-4	0.0116	2,695	0.1992	52.2	8,417	52.03	42,258
8	G-400-2	315	5,300	-7	0.0106	2,990	0.1977	50.0	9,588	71.02	48,488
9	G-1000-2	340	6,600	-7	0.0103	3,105	0.1992	49.2	10,141	81.51	50,901
10	C-M-100-1	191	4,900	-7	0.0133	2,740	0.2291	41.4	10,383	65.26	45,319
11	C-M-100-2	134	4,200	-4	0.0127	2,676	0.2085	47.0	8,955	53.63	42,954
12	C-G-400-2	259	5,300	-7	0.0119	2,987	0.2132	42.2	10,663	77.68	50,008
13	C-G-1000-2	282	6,600	-7	0.0115	3,142	0.2155	40.4	11,508	91.02	53,405

1/ Present Value and Equivalent Annual Costs include costs for construction of coastal landscape measures. The final array of alternatives, as presented elsewhere in the report, do not include these costs since sustaining the current coastal landscape in this area appears to provide minimal contribution, if any, to reduction of risk from hurricane surge. Since deleting the coastal landscape costs affects all alternatives equally, the relative ranking of alternatives remains the same.

Planning Unit 3a

Evaluation Criteria Data Ordinal Rankings

(Scenario 1, Low Relative Sea Level Rise, High Employment, Dispersed Population; Low Uncertainty)

Plan #	Alternative	Stakeholder (Multi-Criteria Decision Analysis)	Minimizing Environmental Impacts		Investment Decision (Efficiency)			Minimizing Remaining Risk (Effectiveness)			Year 2025 Present Value Life Cycle Costs (2010-2075) ($Millions)
Evaluation Criteria		Cumulative Ranking Score from MCDA Trend Analysis	Direct Wetland Impact	Indirect Impacts	Cost Efficiency	Total System Costs	Period of Analysis Cost Efficiency	Annualized Residual Damages	Period of Analysis Risk Reduction	Average % Risk Reduction	
(Units)		(Unit-less Weight)	(Acres)	(Unit-less Scale)	Ratio: Risk Reduction / Present Value Life Cycle Costs (PV LCC)	Annualized Life Cycle Costs + EA Residual Damages ($Millions)	Cost Efficiency Ratio: Event Freq Risk Reduction X Probability of Occurrence (2010-2075) / PV LCC	Average Annual Remaining Risk (Millions)	Event Freq Risk Reduction X Probability (2010-2075) ($Millions)	2075: 100-yr to 2,000-yr Frequency Events (Avg % of No Action Damages)	
2	Coastal	8	4	4	12	4	12	12	12	12	1
3	NS-100	3	2	2	3	2	11	9	11	11	2
4	NS-400	2	1	1	2	1	2	2	9	10	3
5	NS-1000	1	3	3	1	3	1	1	3	4	4
6	M-100-1	7	8	8	6	8	4	6	6	7	7
7	M-100-2	5	6	6	8	6	9	11	10	9	5
8	G-400-2	11	10	10	10	10	10	10	7	5	9
9	G-1000-2	12	11	11	11	11	8	8	5	2	11
10	C-M-100-1	6	7	7	4	7	3	4	4	6	8
11	C-M-100-2	4	5	5	5	5	7	7	8	8	6
12	C-G-400-2	9	9	9	7	9	6	5	2	3	10
13	C-G-1000-2	10	12	12	9	12	5	3	1	1	12

Planning Unit 3a

Cost Efficiency Analysis

(Scenario 1 - LRSLR, High Employment, Dispersed Population; Low Uncertainty)

Plan #	Alternative	Present Value Life-Cycle Costs ($ Millions) 1/	Risk Reduction Annual Equivalent ($ Millions)	Cost Efficiency Factor Risk Red / PV Costs	Rank
5	NS-1000	34,999	698	0.0199	1
4	NS-400	33,959	663	0.0195	2
3	NS-100	31,102	516	0.0166	3
10	C-M-100-1	45,319	602	0.0133	4
11	C-M-100-2	42,954	545	0.0127	5
6	M-100-1	44,688	554	0.0124	6
12	C-G-400-2	50,008	594	0.0119	7
7	M-100-2	42,258	491	0.0116	8
13	C-G-1000-2	53,405	613	0.0115	9
8	G-400-2	48,488	514	0.0106	10
9	G-1000-2	50,901	522	0.0103	11
2	Coastal	23,276	1	0.0000	12

1/ Present Value Costs shown include costs for construction of coastal landscape measures. The final array of alternatives, as presented elsewhere in the report, do not include these costs since sustaining the current coastal landscape in this area appears to provide minimal contribution, if any, to reduction of risk from hurricane surge. Since deleting the coastal landscape costs affects all alternatives equally, the relative ranking of alternatives remains the same.

Planning Unit 3a

Cost Efficiency Rankings

Rank	Scenario 1 Low RSLR High Employment Dispersed Population	Scenario 2 High RSLR High Employment Dispersed Population	Scenario 3 Low RSLR Business-as-Usual Compact Population	Scenario 4 High RSLR Business-as-Usual Compact Population
1	NS-1000	NS-1000	NS-1000	NS-1000
2	NS-400	NS-400	NS-400	NS-400
3	NS-100	NS-100	NS-100	NS-100
4	C-M-100-1	C-M-100-1	C-M-100-1	C-M-100-1
5	C-M-100-2	C-M-100-2	C-M-100-2	C-M-100-2
6	M-100-1	M-100-1	M-100-1	M-100-1
7	C-G-400-2	M-100-2	C-G-400-2	M-100-2
8	M-100-2	C-G-400-2	M-100-2	C-G-400-2
9	C-G-1000-2	C-G-1000-2	C-G-1000-2	C-G-1000-2
10	G-400-2	G-400-2	G-400-2	G-400-2
11	G-1000-2	G-1000-2	G-1000-2	G-1000-2
12	Coastal	Coastal	Coastal	Coastal

Planning Unit 3a

Total System Costs Analysis

(Scenario 1 - LRSLR, High Employment, Dispersed Population; Low Uncertainty)

Plan #	Alternative	Equivalent Annual Life-Cycle Costs ($Millions) 1/	With Project Residual Damages ($ Millions)	Total System Costs ($ Millions)	Rank
4	NS-400	1,733	365	2,098	1
3	NS-100	1,587	512	2,099	2
5	NS-1000	1,786	330	2,116	3
2	Coastal	1,189	1,027	2,216	4
11	C-M-100-2	2,193	483	2,676	5
7	M-100-2	2,158	537	2,695	6
10	C-M-100-1	2,314	426	2,740	7
6	M-100-1	2,282	474	2,756	8
12	C-G-400-2	2,553	434	2,987	9
8	G-400-2	2,476	514	2,990	10
9	G-1000-2	2,599	506	3,105	11
13	C-G-1000-2	2,727	415	3,142	12

1/ Equivalent Annual Life-Cycle Costs shown include costs for construction of coastal landscape measures. The final array of alternatives, as presented elsewhere in the report, do not include these costs since sustaining the current coastal landscape in this area appears to provide minimal contribution, if any, to reduction of risk from hurricane surge. Since deleting the coastal landscape costs affects all alternatives equally, the relative ranking of alternatives remains the same.

Planning Unit 3a

Total System Costs Rankings

Rank	Scenario 1 Low RSLR High Employment Dispersed Population	Scenario 2 High RSLR High Employment Dispersed Population	Scenario 3 Low RSLR Business-as-Usual Compact Population	Scenario 4 High RSLR Business-as-Usual Compact Population
1	NS-400	NS-1000	NS-100	NS-400
2	NS-100	NS-400	NS-400	NS-1000
3	NS-1000	NS-100	NS-1000	NS-100
4	Coastal	Coastal	Coastal	Coastal
5	C-M-100-2	C-M-100-2	C-M-100-2	C-M-100-2
6	M-100-2	M-100-2	M-100-2	M-100-2
7	C-M-100-1	C-M-100-1	C-M-100-1	C-M-100-1
8	M-100-1	M-100-1	M-100-1	M-100-1
9	C-G-400-2	C-G-400-2	G-400-2	G-400-2
10	G-400-2	G-400-2	C-G-400-2	C-G-400-2
11	G-1000-2	G-1000-2	G-1000-2	G-1000-2
12	C-G-1000-2	C-G-1000-2	C-G-1000-2	C-G-1000-2

Planning Unit 3a

Period of Analysis Cost Efficiency

(2075 Risk Reduction X Probability (2010-2075) / Present Value Costs For Frequency Events Included in Economic Evaluation)

(Scenario 1: Low RSLR, High Employment, Dispersed Population - Low Uncertainty)

Plan #	Alternative	Remaining Damages by Frequency ($Millions)					Total Risk Reduction X Probabilty 2010-2075 ($Million)	Present Value Life-Cycle Costs ($ Millions) 1/	Cost Efficiency Ratio - Total Risk Reduction / PV Costs	Rank
		10-yr	100-yr	400-yr	1,000-yr	2,000-yr				
No Action Damages ($ Million)		1,460	10,629	22,650	26,922	28,659				
5	NS-1000	79	717	3,068	8,156	16,545	10,644	34,999	0.3041	1
4	NS-400	123	1,271	8,151	19,436	23,655	8,634	33,959	0.2543	2
10	C-M-100-1	107	422	1,852	15,182	20,184	10,383	45,319	0.2291	3
6	M-100-1	347	873	2,015	15,270	20,250	9,894	44,688	0.2214	4
13	C-G-1000-2	102	977	1,651	2,272	3,156	11,508	53,405	0.2155	5
12	C-G-400-2	125	1,188	2,110	9,204	9,921	10,663	50,008	0.2132	6
11	C-M-100-2	152	1,548	5,133	20,469	20,694	8,955	42,954	0.2085	7
9	G-1000-2	403	2,080	3,476	5,200	5,655	10,141	50,901	0.1992	8
7	M-100-2	399	2,082	5,312	20,567	20,763	8,417	42,258	0.1992	9
8	G-400-2	403	2,080	3,483	10,993	11,503	9,588	48,488	0.1977	10
3	NS-100	179	5,111	20,976	26,215	28,308	4,235	31,102	0.1362	11
2	Coastal	1,466	10,574	22,760	27,034	28,781	-6	23,276	-0.0003	12

1/ Present Value Costs shown include costs for construction of coastal landscape measures. The final array of alternatives, as presented elsewhere in the report, do not include these costs since sustaining the current coastal landscape in this area appears to provide minimal contribution, if any, to reduction of risk from hurricane surge. Since deleting the coastal landscape costs affects all alternatives equally, the relative ranking of alternatives remains the same.

Planning Unit 3a

Period of Analysis Cost Efficiency

(2075 Risk Reduction X Probability (2010 - 2075) / Present Value Costs Rankings For Frequency Events Included in Economic Evaluation)

Rank	Scenario 1 Low RSLR High Employment Dispersed Population	Scenario 2 High RSLR High Employment Dispersed Population	Scenario 3 Low RSLR Business-as-Usual Compact Population	Scenario 4 High RSLR Business-as-Usual Compact Population
1	NS-1000	NS-1000	NS-1000	NS-1000
2	NS-400	C-M-100-1	NS-400	NS-400
3	C-M-100-1	NS-400	C-M-100-1	C-M-100-1
4	M-100-1	M-100-1	M-100-1	M-100-1
5	C-G-1000-2	C-M-100-2	C-G-1000-2	C-M-100-2
6	C-G-400-2	C-G-400-2	C-G-400-2	C-G-1000-2
7	C-M-100-2	C-G-1000-2	C-M-100-2	C-G-400-2
8	G-1000-2	M-100-2	M-100-2	M-100-2
9	M-100-2	G-400-2	G-1000-2	G-400-2
10	G-400-2	G-1000-2	G-400-2	G-1000-2
11	NS-100	NS-100	NS-100	NS-100
12	Coastal	Coastal	Coastal	Coastal

Planning Unit 3a

Residual Damages (Remaining Risk) Analysis

(Scenario 1: Low RSLR, High Employment, Dispersed Population - Low Uncertainty)

Plan #	Alternative	No Action Residual Damages ($Millions)	With Project Residual Damages ($ Millions)	% of No Action Damages	Rank
5	NS-1000	1,028	330	32.1	1
4	NS-400	1,028	365	35.5	2
13	C-G-1000-2	1,028	415	40.4	3
10	C-M-100-1	1,028	426	41.4	4
12	C-G-400-2	1,028	434	42.2	5
6	M-100-1	1,028	474	46.1	6
11	C-M-100-2	1,028	483	47.0	7
9	G-1000-2	1,028	506	49.2	8
3	NS-100	1,028	512	49.8	9
8	G-400-2	1,028	514	50.0	10
7	M-100-2	1,028	537	52.2	11
2	Coastal	1,028	1,027	99.9	12

Planning Unit 3a

Residual Damages (Remaining Risk) Rankings

Rank	Scenario 1 Low RSLR High Employment Dispersed Population	Scenario 2 High RSLR High Employment Dispersed Population	Scenario 3 Low RSLR Business-as-Usual Compact Population	Scenario 4 High RSLR Business-as-Usual Compact Population
1	NS-1000	NS-1000	NS-1000	NS-1000
2	NS-400	NS-400	NS-400	NS-400
3	C-G-1000-2	C-G-1000-2	C-G-1000-2	C-G-1000-2
4	C-M-100-1	C-M-100-1	C-M-100-1	C-M-100-1
5	C-G-400-2	C-G-400-2	C-G-400-2	C-G-400-2
6	M-100-1	M-100-1	M-100-1	M-100-1
7	C-M-100-2	C-M-100-2	C-M-100-2	C-M-100-2
8	G-1000-2	G-1000-2	NS-100	G-1000-2
9	NS-100	G-400-2	G-1000-2	G-400-2
10	G-400-2	M-100-2	G-400-2	M-100-2
11	M-100-2	NS-100	M-100-2	NS-100
12	Coastal	Coastal	Coastal	Coastal

Planning Unit 3a

Period of Analysis Risk Reduction

(2075 Risk Reduction X Probability (2010-2075)

For Frequency Events Included in Economic Evaluation)

(Scenario 1: Low RSLR, High Employment, Dispersed Population - Low Uncertainty)

Plan #	Alternative	Remaining Damages by Frequency ($Millions)					Total Risk Reduction X Probability 2010-2075 ($Million)	Rank
		10-yr	100-yr	400-yr	1,000-yr	2,000-yr		
No Action Damages ($ Million)		1,460	10,629	22,650	26,922	28,659		
13	C-G-1000-2	102	977	1,651	2,272	3,156	11,508	1
12	C-G-400-2	125	1,188	2,110	9,204	9,921	10,663	2
5	NS-1000	79	717	3,068	8,156	16,545	10,644	3
10	C-M-100-1	107	422	1,852	15,182	20,184	10,383	4
9	G-1000-2	403	2,080	3,476	5,200	5,655	10,141	5
6	M-100-1	347	873	2,015	15,270	20,250	9,894	6
8	G-400-2	403	2,080	3,483	10,993	11,503	9,588	7
11	C-M-100-2	152	1,548	5,133	20,469	20,694	8,955	8
4	NS-400	123	1,271	8,151	19,436	23,655	8,634	9
7	M-100-2	399	2,082	5,312	20,567	20,763	8,417	10
3	NS-100	179	5,111	20,976	26,215	28,308	4,235	11
2	Coastal	1,466	10,574	22,760	27,034	28,781	-6	12

Planning Unit 3a

Period of Analysis Risk Reduction

(2075 Risk Reduction X Probability (2010 - 2075) Rankings For Frequency Events Included in Economic Evaluation)

Rank	Scenario 1	Scenario 2	Scenario 3	Scenario 4
	Low RSLR High Employment Dispersed Population	High RSLR High Employment Dispersed Population	Low RSLR Business-as-Usual Compact Population	High RSLR Business-as-Usual Compact Population
1	C-G-1000-2	C-G-1000-2	C-G-1000-2	C-G-1000-2
2	C-G-400-2	C-M-100-1	NS-1000	C-M-100-1
3	NS-1000	C-G-400-2	C-G-400-2	C-G-400-2
4	C-M-100-1	M-100-1	C-M-100-1	NS-1000
5	G-1000-2	NS-1000	G-1000-2	M-100-1
6	M-100-1	G-1000-2	M-100-1	G-1000-2
7	G-400-2	G-400-2	G-400-2	G-400-2
8	C-M-100-2	C-M-100-2	NS-400	C-M-100-2
9	NS-400	M-100-2	C-M-100-2	M-100-2
10	M-100-2	NS-400	M-100-2	NS-400
11	NS-100	NS-100	NS-100	NS-100
12	Coastal	Coastal	Coastal	Coastal

Planning Unit 3a
Average % Risk Reduction of Total Damages
For 100-yr to 2,000-yr Frequency Event Range Based on 2075 Population / Land Use
(Scenario 1: Low RSLR, High Employment, Dispersed Population - Low Uncertainty)

Plan #	Alternative	Average % Risk Reduction for 100-yr to 2,000-yr Frequency Events	Average Risk Reduction for 100-yr to 2,000-yr Frequency Events ($ Millions)	Present Value - Life Cycle Costs ($ Millions) 1/	Rank
Total No Action Residual Damages 100-yr to 2,000-yr Freq Events ($ Million)		88,859			
13	C-G-1000-2	91.02	80,877	53,405	1
9	G-1000-2	81.51	72,429	50,901	2
12	C-G-400-2	77.68	69,022	50,008	3
5	NS-1000	72.92	64,797	34,999	4
8	G-400-2	71.02	63,110	48,488	5
10	C-M-100-1	65.26	57,988	45,319	6
6	M-100-1	63.88	56,762	44,688	7
11	C-M-100-2	53.63	47,657	42,954	8
7	M-100-2	52.03	46,232	42,258	9
4	NS-400	49.33	43,835	33,959	10
3	NS-100	15.79	14,031	31,102	11
2	Coastal)	-0.20	-180	23,276	12

1/ Present Value Costs shown include costs for construction of coastal landscape measures. The final array of alternatives, as presented elsewhere in the report, do not include these costs since sustaining the current coastal landscape in this area appears to provide minimal contribution, if any, to reduction of risk from hurricane surge. Since deleting the coastal landscape costs affects all alternatives equally, the relative ranking of alternatives remains the same.

Planning Unit 3a

Average % Risk Reduction of Total Damages Rankings

For 100-yr to 2,000-yr Frequency Event Range Based on 2075 Population / Land Use

(Scenario 1: Low RSLR, High Employment, Dispersed Population - Low Uncertainty)

Rank	Scenario 1 Low RSLR High Employment Dispersed Population	Scenario 2 High RSLR High Employment Dispersed Population	Scenario 3 Low RSLR Business-as-Usual Compact Population	Scenario 4 High RSLR Business-as-Usual Compact Population
1	C-G-1000-2	C-G-1000-2	C-G-1000-2	C-G-1000-2
2	G-1000-2	G-1000-2	G-1000-2	G-1000-2
3	C-G-400-2	C-G-400-2	C-G-400-2	C-G-400-2
4	NS-1000	G-400-2	NS-1000	G-400-2
5	G-400-2	C-M-100-1	G-400-2	C-M-100-1
6	C-M-100-1	M-100-1	C-M-100-1	NS-1000
7	M-100-1	NS-1000	M-100-1	M-100-1
8	C-M-100-2	C-M-100-2	C-M-100-2	C-M-100-2
9	M-100-2	M-100-2	NS-400	M-100-2
10	NS-400	NS-400	M-100-2	NS-400
11	NS-100	NS-100	NS-100	NS-100
12	Coastal	Coastal	Coastal	Coastal

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Planning Unit 3b

Sample Data Rankings and Evaluation Criteria Tables

Planning Unit 3b - Metric Data Summary

(Scenario 1 - Low Relative Sea Level Rise, High Employment, Dispersed Population; Low Uncertainty)

Plan No.	Alternative	Population Impacted	Residual Damages	Life Cycle Cost 1/	Construction Time	Employment Impacted	Indirect Environmental Impact Score	Direct Wetland Impacts	Historic Properties Protected	Historic Districts Protected	Archeo. Sites Protected
		Equiv. Annual #	Equiv. Annual $ Millions	Equiv. Annual $ Millions	Years	Equiv. Annual #	Unit-less Scale -8 to +8	Acres	# Properties	# Districts	# Sites
1	No Action	7,655	469	0	15	2,248	0	0	6	0	14
2	Coastal	7,655	469	243	15	2,247	0	0	2	0	106
3	NS-100	7,118	245	377	15	1,142	0	0	2	0	106
4	NS-400	7,117	183	475	15	781	0	0	2	0	106
5	NS-1000	7,016	166	533	15	705	0	0	2	0	106
6	G-100-1	3,227	210	1,020	10	1,000	-8	2,300	18	5	264
7	F-100-1	3,909	261	954	10	1,148	2	2,500	14	1	154
8	F-400-1	3,871	248	1,440	12	1,135	2	3,900	18	5	154
9	F-1000-1	4,201	267	1,830	14	1,236	2	5,200	18	5	154
10	RL-100-1	5,093	303	834	10	1,221	2	900	11	0	123
11	RL-400-1	4,988	299	1,162	12	1,238	2	1,700	15	3	123
12	C-G-100-1	3,191	191	1,032	10	928	-8	2,300	18	5	264
13	C-F-100-1	3,839	229	972	10	1,046	2	2,500	14	1	154
14	C-F-400-1	3,801	209	1,455	12	1,017	2	3,900	18	5	154
15	C-F-1000-1	4,128	224	1,853	14	1,104	2	5,200	18	5	154
16	C-RL-100-1	4,988	244	878	10	1,085	2	900	11	0	123
17	C-RL-400-1	4,882	213	1,213	12	1,037	2	1,700	15	3	123

1/ Equivalent Annual Costs shown include costs for construction of coastal landscape measures. The final array of alternatives, as presented elsewhere in the report, do not include these costs since sustaining the current coastal landscape in this area appears to provide minimal contribution, if any, to reduction of risk from hurricane surge. Since deleting the coastal landscape costs affects all alternatives equally, the relative ranking of alternatives remains the same.

Planning Unit 3b - Relative Ranking of Alternatives Based On Individual Metrics

(Scenario 1 - Low Relative Sea Level Rise, High Employment, Dispersed Population; Low Uncertainty)

Rank	Population Impacted	Residual Damages	Life Cycle Cost	Construction Time	Employment Impacted	Indirect Environmental Impact Score	Direct Wetland Impacts	Historic Properties Protected	Historic Districts Protected	Archeo. Sites Protected
1	C-G-100-1	NS-1000	No Action	RL-100-1	NS-1000	RL-100-1	No Action	G-100-1	G-100-1	G-100-1
2	G-100-1	NS-400	Coastal	C-RL-100-1	NS-400	C-RL-100-1	Coastal	C-G-100-1	C-G-100-1	C-G-100-1
3	C-F-400-1	C-G-100-1	NS-100	F-100-1	C-G-100-1	F-100-1	NS-100	F-400-1	F-400-1	F-100-1
4	C-F-100-1	C-F-400-1	NS-400	C-F-100-1	G-100-1	C-F-100-1	NS-400	C-F-400-1	C-F-400-1	C-F-100-1
5	F-400-1	G-100-1	NS-1000	G-100-1	C-F-400-1	RL-400-1	NS-1000	F-1000-1	F-1000-1	F-400-1
6	F-100-1	C-RL-400-1	RL-100-1	C-G-100-1	C-RL-400-1	C-RL-400-1	RL-100-1	C-F-1000-1	C-F-1000-1	C-F-400-1
7	C-F-1000-1	C-F-1000-1	C-RL-100-1	RL-400-1	C-F-100-1	F-400-1	C-RL-100-1	RL-400-1	RL-400-1	F-1000-1
8	F-1000-1	C-F-100-1	F-100-1	C-RL-400-1	C-RL-100-1	C-F-400-1	RL-400-1	C-RL-400-1	C-RL-400-1	C-F-1000-1
9	C-RL-400-1	C-RL-100-1	C-F-100-1	F-400-1	C-F-1000-1	F-1000-1	C-RL-400-1	F-100-1	F-100-1	RL-100-1
10	RL-400-1	NS-100	G-100-1	C-F-400-1	F-400-1	C-F-1000-1	G-100-1	C-F-100-1	C-F-100-1	C-RL-100-1
11	C-RL-100-1	F-400-1	C-G-100-1	F-1000-1	NS-100	No Action	C-G-100-1	RL-100-1	No Action	RL-400-1
12	RL-100-1	F-100-1	RL-400-1	C-F-1000-1	F-100-1	Coastal	F-100-1	C-RL-100-1	Coastal	C-RL-400-1
13	NS-1000	F-1000-1	C-RL-400-1	No Action	RL-100-1	NS-100	C-F-100-1	No Action	NS-100	Coastal
14	NS-400	RL-400-1	F-400-1	Coastal	F-1000-1	NS-400	F-400-1	Coastal	NS-400	NS-100
15	NS-100	RL-100-1	C-F-400-1	NS-100	RL-400-1	NS-1000	C-F-400-1	NS-100	NS-1000	NS-400
16	Coastal	Coastal	F-1000-1	NS-400	Coastal	G-100-1	F-1000-1	NS-400	RL-100-1	NS-1000
17	No Action	No Action	C-F-1000-1	NS-1000	No Action	C-G-100-1	C-F-1000-1	NS-1000	C-RL-100-1	No Action

Planning Unit 3b - Multi-Criteria Decision Analysis (MCDA) Trend Analysis

(Scenario 1 - Low Relative Sea Level Rise, High Employment, Dispersed Population; Low Uncertaintyl)

Plan #	Alternative	Plan Rank By Each Respondant																									Total Ranking Score (All Respondants)
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	
16	C-RL-100-1	3	2	1	1	4	2	11	8	1	1	9	1	1	2	1	7	1	3	4	1	1	1	2	1	2	71
13	C-F-100-1	5	1	3	2	3	1	5	5	2	2	5	2	3	1	2	4	3	5	3	8	5	3	1	3	1	78
7	F-100-1	7	4	4	4	5	3	8	7	5	3	8	4	6	5	5	8	4	7	5	9	6	4	4	4	3	132
10	RL-100-1	6	6	2	3	7	7	12	12	3	4	11	3	5	7	3	9	2	8	6	4	3	2	6	2	7	140
17	C-RL-400-1	8	7	5	5	8	4	6	6	4	5	3	7	9	6	4	5	7	4	7	10	7	5	7	6	5	150
12	C-G-100-1	15	3	13	11	1	6	1	1	8	7	10	9	7	3	12	1	10	1	1	5	2	12	3	13	4	159
6	G-100-1	17	5	14	12	2	8	2	2	10	8	12	11	10	4	13	2	11	2	2	6	4	13	5	14	8	197
14	C-F-400-1	10	8	10	10	6	5	3	3	6	6	1	12	12	8	9	3	12	6	8	13	12	10	8	10	6	197
5	NS-1000	1	11	6	6	11	11	13	13	11	11	13	5	2	11	7	13	5	11	11	2	9	6	11	5	11	216
11	RL-400-1	9	9	9	8	10	10	10	10	9	9	7	10	11	10	6	10	9	10	9	11	8	8	10	9	10	231
8	F-400-1	11	10	11	13	9	9	4	4	7	10	2	13	13	9	11	6	13	9	10	14	13	11	9	11	9	241
4	NS-400	2	12	7	7	12	12	14	14	12	12	14	6	4	12	8	14	6	12	12	3	10	7	12	7	12	243
3	NS-100	4	13	8	9	13	13	15	15	13	13	15	8	8	13	10	15	8	14	13	7	11	9	13	8	13	281
15	C-F-1000-1	14	14	16	14	14	14	7	9	14	14	4	15	15	14	14	11	15	13	14	16	15	15	14	15	14	334
9	F-1000-1	16	15	17	16	15	15	9	11	15	15	6	17	16	15	15	12	16	15	15	17	16	16	15	17	15	367
2	No Action	12	16	12	15	16	16	16	16	16	16	16	14	14	16	16	16	14	16	16	12	14	14	16	12	16	373
1	Coastal	13	17	15	17	17	17	17	17	17	17	17	16	17	17	17	17	17	17	17	15	17	17	17	16	17	415

Planning Unit 3b

MCDA Trend Analysis (Ranked by Total Ranking Scores - All Respondants)

Rank	Scenario 1 Low RSLR High Employment Dispersed Population	Scenario 2 High RSLR High Employment Dispersed Population	Scenario 3 Low RSLR Business-as-Usual Compact Population	Scenario 4 High RSLR Business-as-Usual Compact Population
1	C-RL-100-1	C-F-100-1	C-RL-100-1	C-F-100-1
2	C-F-100-1	C-RL-100-1	C-F-100-1	C-RL-100-1
3	F-100-1	F-100-1	F-100-1	F-100-1
4	RL-100-1	C-G-100-1	RL-100-1	RL-100-1
5	C-RL-400-1	RL-100-1	C-RL-400-1	C-G-100-1
6	C-G-100-1	C-RL-400-1	C-G-100-1	C-RL-400-1
7	G-100-1	G-100-1	C-F-400-1	C-F-400-1
8	C-F-400-1	C-F-400-1	G-100-1	G-100-1
9	NS-1000	NS-1000	RL-400-1	NS-1000
10	RL-400-1	NS-400	NS-1000	NS-400
11	F-400-1	F-400-1	NS-400	F-400-1
12	NS-400	RL-400-1	F-400-1	RL-400-1
13	NS-100	NS-100	NS-100	NS-100
14	C-F-1000-1	C-F-1000-1	C-F-1000-1	C-F-1000-1
15	F-1000-1	F-1000-1	F-1000-1	F-1000-1
16	Coastal	Coastal	Coastal	Coastal
17	No Action	No Action	No Action	No Action

Planning Unit 3b

Evaluation Criteria Values

(Scenario 1, Low Relative Sea Level Rise, High Employment, Dispersed Population; Low Uncertainty)

Plan #	Alternative	Stakeholder (Multi-Criteria Decision Analysis)	Minimizing Environmental Impacts		Investment Decision (Efficiency) 1/			Minimizing Remaining Risk (Effectiveness)			Year 2025 Present Value Life Cycle Costs (2010-2075) ($Millions) 1/
Evaluation Criteria		Cumulative Ranking Score from MCDA Trend Analysis	Direct Wetland Impact	Indirect Impacts	Cost Efficiency	Total System Costs	Period of Analysis Cost Efficiency	Annualized Residual Damages	Period of Analysis Risk Reduction	Average % Risk Reduction	
(Units)		*(Unit-less Weight)*	*(Acres)*	*(Unit-less Scale)*	*Ratio: Risk Reduction / Present Value Life Cycle Costs (PV LCC)*	*Annualized Life Cycle Costs + EA Residual Damages ($Millions)*	*Cost Efficiency Ratio: Event Freq Risk Reduction X Probability of Occurrence (2010-2075) / PV LCC*	*Average Annual Remaining Risk (Millions)*	*Event Freq Risk Reduction X Probability (2010-2075) ($Millions)*	*2075: 100-yr to 2,000-yr Frequency Events (Avg % of No Action Damages)*	
2	Coastal	373	0	0	0.0000	712	0.0004	100.0	2	0.01	4,756
3	NS-100	281	0	0	0.0304	622	0.2608	52.2	1,926	14.50	7,383
4	NS-400	243	0	0	0.0308	658	0.3812	38.9	3,550	41.13	9,313
5	NS-1000	216	0	0	0.0290	699	0.4276	35.4	4,471	67.43	10,457
6	G-100-1	197	2,300	-8	0.0130	1,230	0.2338	44.8	4,669	77.12	19,970
7	F-100-1	132	2,500	2	0.0112	1,215	0.1609	55.6	3,005	32.12	18,674
8	F-400-1	241	3,900	2	0.0079	1,688	0.1605	52.8	4,525	84.06	28,200
9	F-1000-1	367	5,200	2	0.0057	2,096	0.1266	56.8	4,538	84.78	35,830
10	RL-100-1	140	900	2	0.0102	1,138	0.1451	64.6	2,370	27.45	16,335
11	RL-400-1	231	1,700	2	0.0075	1,461	0.1332	63.7	3,031	45.06	22,752
12	C-G-100-1	159	2,300	-8	0.0138	1,224	0.2412	40.8	4,875	79.09	20,214
13	C-F-100-1	78	2,500	2	0.0126	1,201	0.1752	48.8	3,335	35.27	19,039
14	C-F-400-1	197	3,900	2	0.0092	1,664	0.1755	44.4	5,000	89.37	28,494
15	C-F-1000-1	334	5,200	2	0.0068	2,077	0.1408	47.8	5,108	91.90	36,288
16	C-RL-100-1	71	900	2	0.0131	1,122	0.1717	52.0	2,952	33.21	17,197
17	C-RL-400-1	150	1,700	2	0.0108	1,426	0.1800	45.4	4,276	61.63	23,754

1/ Present Value and Equivalent Annual Costs include costs for construction of coastal landscape measures. The final array of alternatives, as presented elsewhere in the report, do not include these costs since sustaining the current coastal landscape in this area appears to provide minimal contribution, if any, to reduction of risk from hurricane surge. Since deleting the coastal landscape costs affects all alternatives equally, the relative ranking of alternatives remains the same.

Planning Unit 3b
Evaluation Criteria Data Ordinal Rankings
(Scenario 1, Low Relative Sea Level Rise, High Employment, Dispersed Population; Low Uncertainty)

Plan #	Alternative	Stakeholder (Multi-Criteria Decision Analysis)	Minimizing Environmental Impacts		Investment Decision (Efficiency)			Minimizing Remaining Risk (Effectiveness)			Year 2025 Present Value Life Cycle Costs (2010-2075) ($Millions)
Evaluation Criteria		Cumulative Ranking Score from MCDA Trend Analysis	Direct Wetland Impact	Indirect Impacts	Cost Efficiency	Total System Costs	Period of Analysis Cost Efficiency	Annualized Residual Damages	Period of Analysis Risk Reduction	Average % Risk Reduction	
(Units)		(Unit-less Weight)	(Acres)	(Unit-less Scale)	Ratio: Risk Reduction / Present Value Life Cycle Costs (PV LCC)	Annualized Life Cycle Costs + EA Residual Damages ($Millions)	Cost Efficiency Ratio: Event Freq Risk Reduction X Probability of Occurrence (2010-2075) / PV LCC	Average Annual Remaining Risk (Millions)	Event Freq Risk Reduction X Probability (2010-2075) ($Millions)	2075: 100-yr to 2,000-yr Frequency Events (Avg % of No Action Damages)	
5	NS-1000	9	1	11	3	3	1	1	7	7	4
4	NS-400	12	1	11	1	2	2	2	9	10	3
12	C-G-100-1	6	11	15	4	9	4	3	3	5	10
6	G-100-1	7	5	15	6	10	5	5	4	6	9
3	NS-100	13	1	11	2	1	3	10	15	15	2
13	C-F-100-1	2	11	1	7	7	8	8	10	11	8
14	C-F-400-1	8	13	1	11	13	7	4	2	2	14
16	C-RL-100-1	1	15	1	5	5	9	9	13	12	6
7	F-100-1	3	5	1	8	8	10	12	12	13	7
17	C-RL-400-1	5	15	1	9	11	6	6	8	8	12
8	F-400-1	11	7	1	12	14	11	11	6	4	13
10	RL-100-1	4	9	1	10	6	12	15	14	14	5
15	C-F-1000-1	14	13	1	14	15	13	7	1	1	16
11	RL-400-1	10	9	1	13	12	14	14	11	9	11
9	F-1000-1	15	7	1	15	16	15	13	5	3	15
2	Coastal	16	1	11	16	4	16	16	16	16	1

Planning Unit 3b

Cost Efficiency Analysis

(Scenario 1 - LRSLR, High Employment, Dispersed Population; Low Uncertainty)

Plan #	Alternative	Present Value Life-Cycle Costs ($ Millions) 1/	Risk Reduction Equivalent Annual ($ Millions)	Cost Efficiency Factor Risk Red / PV Costs	Rank
4	NS-400	9,313	287	0.0308	1
3	NS-100	7,383	225	0.0304	2
5	NS-1000	10,457	303	0.0290	3
12	C-G-100-1	20,214	278	0.0138	4
16	C-RL-100-1	17,197	225	0.0131	5
6	G-100-1	19,970	259	0.0130	6
13	C-F-100-1	19,039	240	0.0126	7
7	F-100-1	18,674	209	0.0112	8
17	C-RL-400-1	23,754	256	0.0108	9
10	RL-100-1	16,335	166	0.0102	10
14	C-F-400-1	28,494	261	0.0092	11
8	F-400-1	28,200	221	0.0079	12
11	RL-400-1	22,752	170	0.0075	13
15	C-F-1000-1	36,288	245	0.0068	14
9	F-1000-1	35,830	203	0.0057	15
2	Coastal	4,756	0	0.0000	16

1/ Present Value Costs shown include costs for construction of coastal landscape measures. The final array of alternatives, as presented elsewhere in the report, do not include these costs since sustaining the current coastal landscape in this area appears to provide minimal contribution, if any, to reduction of risk from hurricane surge. Since deleting the coastal landscape costs affects all alternatives equally, the relative ranking of alternatives remains the same.

Planning Unit 3b

Cost Efficiency Rankings

Rank	Scenario 1	Scenario 2	Scenario 3	Scenario 4
	Low RSLR High Employment Dispersed Population	High RSLR High Employment Dispersed Population	Low RSLR Business-as-Usual Compact Population	High RSLR Business-as-Usual Compact Population
1	NS-400	NS-400	NS-100	NS-400
2	NS-100	NS-1000	NS-400	NS-100
3	NS-1000	NS-100	NS-1000	NS-1000
4	C-G-100-1	C-G-100-1	C-G-100-1	C-G-100-1
5	C-RL-100-1	G-100-1	C-RL-100-1	C-RL-100-1
6	G-100-1	C-RL-100-1	G-100-1	G-100-1
7	C-F-100-1	C-F-100-1	C-F-100-1	C-F-100-1
8	F-100-1	F-100-1	F-100-1	F-100-1
9	C-RL-400-1	C-RL-400-1	C-RL-400-1	RL-100-1
10	RL-100-1	RL-100-1	RL-100-1	C-RL-400-1
11	C-F-400-1	C-F-400-1	C-F-400-1	C-F-400-1
12	F-400-1	F-400-1	F-400-1	F-400-1
13	RL-400-1	RL-400-1	RL-400-1	RL-400-1
14	C-F-1000-1	C-F-1000-1	C-F-1000-1	C-F-1000-1
15	F-1000-1	F-1000-1	F-1000-1	F-1000-1
16	Coastal	Coastal	Coastal	Coastal

Planning Unit 3b

Total System Costs Analysis

(Scenario 1 - LRSLR, High Employment, Dispersed Population; Low Uncertainty)

Plan #	Alternative	Equivalent Annual Life-Cycle Costs ($Millions) 1/	With Project Residual Damages ($ Millions)	Total System Costs ($ Millions)	Rank
3	NS-100	377	245	622	1
4	NS-400	475	183	658	2
5	NS-1000	533	166	699	3
2	Coastal	243	469	712	4
16	C-RL-100-1	878	244	1,122	5
10	RL-100-1	834	303	1,138	6
13	C-F-100-1	972	229	1,201	7
7	F-100-1	954	261	1,215	8
12	C-G-100-1	1,032	191	1,224	9
6	G-100-1	1,020	210	1,230	10
17	C-RL-400-1	1,213	213	1,426	11
11	RL-400-1	1,162	299	1,461	12
14	C-F-400-1	1,455	209	1,664	13
8	F-400-1	1,440	248	1,688	14
15	C-F-1000-1	1,853	224	2,077	15
9	F-1000-1	1,830	267	2,096	16

1/ Equivalent Annual Life-Cycle Costs shown include costs for construction of coastal landscape measures. The final array of alternatives, as presented elsewhere in the report, do not include these costs since sustaining the current coastal landscape in this area appears to provide minimal contribution, if any, to reduction of risk from hurricane surge. Since deleting the coastal landscape costs affects all alternatives equally, the relative ranking of alternatives remains the same.

Planning Unit 3b

Total System Costs Rankings

Rank	Scenario 1 Low RSLR High Employment Dispersed Population	Scenario 2 High RSLR High Employment Dispersed Population	Scenario 3 Low RSLR Business-as-Usual Compact Population	Scenario 4 High RSLR Business-as-Usual Compact Population
1	NS-100	NS-100	NS-100	NS-100
2	NS-400	NS-400	NS-400	NS-400
3	NS-1000	NS-1000	Coastal	NS-1000
4	Coastal	Coastal	NS-1000	Coastal
5	C-RL-100-1	C-RL-100-1	C-RL-100-1	C-RL-100-1
6	RL-100-1	RL-100-1	RL-100-1	RL-100-1
7	C-F-100-1	C-F-100-1	C-F-100-1	C-F-100-1
8	F-100-1	F-100-1	F-100-1	F-100-1
9	C-G-100-1	C-G-100-1	C-G-100-1	C-G-100-1
10	G-100-1	G-100-1	G-100-1	G-100-1
11	C-RL-400-1	C-RL-400-1	RL-400-1	RL-400-1
12	RL-400-1	RL-400-1	C-RL-400-1	C-RL-400-1
13	C-F-400-1	C-F-400-1	C-F-400-1	C-F-400-1
14	F-400-1	F-400-1	F-400-1	F-400-1
15	C-F-1000-1	C-F-1000-1	C-F-1000-1	C-F-1000-1
16	F-1000-1	F-1000-1	F-1000-1	F-1000-1

Planning Unit 3b

Period of Analysis Cost Efficiency

(2075 Risk Reduction X Probability (2010-2075) / Present Value Costs
For Frequency Events Included in Economic Evaluation)
(Scenario 1: Low RSLR, High Employment, Dispersed Population - Low Uncertainty)

Plan #	Alternative	Remaining Damages by Frequency ($Millions)					Total Risk Reduction X Probabilty 2010-2075 ($Million)	Present Value Life-Cycle Costs ($ Millions) 1/	Cost Efficiency Ratio Total Risk Reduction / PV Costs	Rank
		10-yr	100-yr	400-yr	1,000-yr	2,000-yr				
No Action Damages ($ Million)		1,024	4,254	8,571	11,203	12,281				
5	NS-1000	103	433	817	3,928	9,274	4,471	10,457	0.4276	1
4	NS-400	116	537	3,643	9,691	11,524	3,550	9,313	0.3812	2
3	NS-100	141	2,344	7,954	10,805	11,993	1,926	7,383	0.2608	3
12	C-G-100-1	68	147	426	2,733	6,240	4,875	20,214	0.2412	4
6	G-100-1	158	318	567	2,867	6,368	4,669	19,970	0.2338	5
17	C-RL-400-1	95	291	1,827	6,161	8,635	4,276	23,754	0.1800	6
14	C-F-400-1	70	244	763	1,369	1,921	5,000	28,494	0.1755	7
13	C-F-100-1	83	418	5,300	10,720	11,245	3,335	19,039	0.1752	8
16	C-RL-100-1	107	1,038	6,486	9,360	10,261	2,952	17,197	0.1717	9
7	F-100-1	222	713	5,508	10,913	11,431	3,005	18,674	0.1609	10
8	F-400-1	222	711	1,238	1,679	2,167	4,525	28,200	0.1605	11
10	RL-100-1	316	1,664	6,800	9,637	10,525	2,370	16,335	0.1451	12
15	C-F-1000-1	65	153	556	1,125	1,507	5,108	36,288	0.1408	13
11	RL-400-1	316	1,628	3,993	6,852	9,058	3,031	22,752	0.1332	14
9	F-1000-1	222	711	1,236	1,652	1,844	4,538	35,830	0.1266	15
2	Coastal	1,022	4,253	8,576	11,197	12,280	2	4,756	0.0004	16

1/ Present Value Costs shown include costs for construction of coastal landscape measures. The final array of alternatives, as presented elsewhere in the report, do not include these costs since sustaining the current coastal landscape in this area appears to provide minimal contribution, if any, to reduction of risk from hurricane surge. Since deleting the coastal landscape costs affects all alternatives equally, the relative ranking of alternatives remains the same.

Planning Unit 3b

Period of Analysis Cost Efficiency Rankings

(2075 Risk Reduction X Probability (2010 - 2075) / Present Value Costs Rankings For Frequency Events Included in Economic Evaluation)

Rank	Scenario 1	Scenario 2	Scenario 3	Scenario 4
	Low RSLR High Employment Dispersed Population	High RSLR High Employment Dispersed Population	Low RSLR Business-as-Usual Compact Population	High RSLR Business-as-Usual Compact Population
1	NS-1000	NS-1000	NS-1000	NS-1000
2	NS-400	NS-400	NS-400	NS-400
3	NS-100	C-G-100-1	NS-100	C-G-100-1
4	C-G-100-1	G-100-1	C-G-100-1	G-100-1
5	G-100-1	NS-100	G-100-1	NS-100
6	C-RL-400-1	C-F-100-1	C-RL-400-1	C-F-100-1
7	C-F-400-1	F-100-1	C-RL-100-1	C-RL-100-1
8	C-F-100-1	C-RL-400-1	C-F-400-1	F-100-1
9	C-RL-100-1	C-RL-100-1	C-F-100-1	C-RL-400-1
10	F-100-1	C-F-400-1	F-400-1	C-F-400-1
11	F-400-1	F-400-1	F-100-1	F-400-1
12	RL-100-1	RL-100-1	RL-100-1	RL-100-1
13	C-F-1000-1	C-F-1000-1	C-F-1000-1	RL-400-1
14	RL-400-1	RL-400-1	RL-400-1	C-F-1000-1
15	F-1000-1	F-1000-1	F-1000-1	F-1000-1
16	Coastal	Coastal	Coastal	Coastal

Planning Unit 3b

Residual Damages (Remaining Risk) Analysis

(Scenario 1: Low RSLR, High Employment, Dispersed Population - Low Uncertainty)

Plan #	Alternative	No Action Residual Damages ($Millions)	With Project Residual Damages ($ Millions)	% of No Action Damages	Rank
5	NS-1000	469	166	35.4	1
4	NS-400	469	183	38.9	2
12	C-G-100-1	469	191	40.8	3
14	C-F-400-1	469	209	44.4	4
6	G-100-1	469	210	44.8	5
17	C-RL-400-1	469	213	45.4	6
15	C-F-1000-1	469	224	47.8	7
13	C-F-100-1	469	229	48.8	8
16	C-RL-100-1	469	244	52.0	9
3	NS-100	469	245	52.2	10
8	F-400-1	469	248	52.8	11
7	F-100-1	469	261	55.6	12
9	F-1000-1	469	267	56.8	13
11	RL-400-1	469	299	63.7	14
10	RL-100-1	469	303	64.6	15
2	Coastal	469	469	100.0	16

Planning Unit 3b

Residual Damages (Remaining Risk) Rankings

Rank	Scenario 1	Scenario 2	Scenario 3	Scenario 4
	Low RSLR High Employment Dispersed Population	High RSLR High Employment Dispersed Population	Low RSLR Business-as-Usual Compact Population	High RSLR Business-as-Usual Compact Population
1	NS-1000	NS-1000	NS-1000	NS-1000
2	NS-400	NS-400	NS-400	NS-400
3	C-G-100-1	C-G-100-1	C-G-100-1	C-G-100-1
4	C-F-400-1	G-100-1	C-F-400-1	C-F-400-1
5	G-100-1	C-F-400-1	G-100-1	G-100-1
6	C-RL-400-1	C-RL-400-1	C-RL-400-1	C-RL-400-1
7	C-F-1000-1	C-F-1000-1	C-F-1000-1	C-F-1000-1
8	C-F-100-1	C-F-100-1	C-F-100-1	C-F-100-1
9	C-RL-100-1	F-400-1	C-RL-100-1	F-400-1
10	NS-100	C-RL-100-1	NS-100	C-RL-100-1
11	F-400-1	F-100-1	F-400-1	F-100-1
12	F-100-1	NS-100	F-100-1	NS-100
13	F-1000-1	F-1000-1	F-1000-1	F-1000-1
14	RL-400-1	RL-400-1	RL-400-1	RL-400-1
15	RL-100-1	RL-100-1	RL-100-1	RL-100-1
16	Coastal	Coastal	Coastal	Coastal

Planning Unit 3b

Period of Analysis Risk Reduction

(2075 Risk Reduction X Probability (2010-2075)

For Frequency Events Included in Economic Evaluation)

(Scenario 1: Low RSLR, High Employment, Dispersed Population - Low Uncertainty)

Plan #	Alternative	Remaining Damages by Frequency ($Millions)					Total Risk Reduction X Probability 2010-2075 ($Million)	Rank
		10-yr	100-yr	400-yr	1,000-yr	2,000-yr		
No Action Damages ($ Million)		1,024	4,254	8,571	11,203	12,281		
15	C-F-1000-1	65	153	556	1,125	1,507	5,108	1
14	C-F-400-1	70	244	763	1,369	1,921	5,000	2
12	C-G-100-1	68	147	426	2,733	6,240	4,875	3
6	G-100-1	158	318	567	2,867	6,368	4,669	4
9	F-1000-1	222	711	1,236	1,652	1,844	4,538	5
8	F-400-1	222	711	1,238	1,679	2,167	4,525	6
5	NS-1000	103	433	817	3,928	9,274	4,471	7
17	C-RL-400-1	95	291	1,827	6,161	8,635	4,276	8
4	NS-400	116	537	3,643	9,691	11,524	3,550	9
13	C-F-100-1	83	418	5,300	10,720	11,245	3,335	10
11	RL-400-1	316	1,628	3,993	6,852	9,058	3,031	11
7	F-100-1	222	713	5,508	10,913	11,431	3,005	12
16	C-RL-100-1	107	1,038	6,486	9,360	10,261	2,952	13
10	RL-100-1	316	1,664	6,800	9,637	10,525	2,370	14
3	NS-100	141	2,344	7,954	10,805	11,993	1,926	15
2	Coastal	1,022	4,253	8,576	11,197	12,280	2	16

Planning Unit 3b

Period of Analysis Risk Reduction

(2075 Risk Reduction X Probability (2010 - 2075) Rankings

For Frequency Events Included in Economic Evaluation)

Rank	Scenario 1 Low RSLR High Employment Dispersed Population	Scenario 2 High RSLR High Employment Dispersed Population	Scenario 3 Low RSLR Business-as-Usual Compact Population	Scenario 4 High RSLR Business-as-Usual Compact Population
1	C-F-1000-1	C-F-1000-1	C-F-1000-1	C-F-1000-1
2	C-F-400-1	C-F-400-1	C-F-400-1	C-F-400-1
3	C-G-100-1	C-G-100-1	C-G-100-1	C-G-100-1
4	G-100-1	G-100-1	G-100-1	G-100-1
5	F-1000-1	F-1000-1	F-1000-1	F-1000-1
6	F-400-1	F-400-1	F-400-1	F-400-1
7	NS-1000	NS-1000	NS-1000	C-RL-400-1
8	C-RL-400-1	C-RL-400-1	C-RL-400-1	NS-1000
9	NS-400	C-F-100-1	NS-400	C-F-100-1
10	C-F-100-1	F-100-1	C-F-100-1	F-100-1
11	RL-400-1	NS-400	RL-400-1	NS-400
12	F-100-1	RL-400-1	C-RL-100-1	RL-400-1
13	C-RL-100-1	C-RL-100-1	F-100-1	C-RL-100-1
14	RL-100-1	RL-100-1	RL-100-1	RL-100-1
15	NS-100	NS-100	NS-100	NS-100
16	Coastal	Coastal	Coastal	Coastal

Planning Unit 3b

Average % Risk Reduction of Total Damages

For 100-yr to 2,000-yr Frequency Event Range Based on 2075 Population / Land Use

(Scenario 1: Low RSLR, High Employment, Dispersed Population - Low Uncertainty)

Plan #	Alternative	Average % Risk Reduction for 100-yr to 2,000-yr Frequency Events	Average Risk Reduction for 100-yr to 2,000-yr Frequency Events ($ Millions)	Present Value Life Cycle Costs ($ Millions)	Rank
Total No Action Residual Damages 100-yr to 2,000-yr Freq Events ($ Million)		36,309			
15	C-F-1000-1	91.90	33,368	36,288	1
14	C-F-400-1	89.37	32,451	28,494	2
9	F-1000-1	84.78	30,783	35,830	3
8	F-400-1	84.06	30,520	28,200	4
12	C-G-100-1	79.09	28,717	20,214	5
6	G-100-1	77.12	28,000	19,970	6
5	NS-1000	67.43	24,482	10,457	7
17	C-RL-400-1	61.63	22,378	23,754	8
11	RL-400-1	45.06	16,360	22,752	9
4	NS-400	41.13	14,935	9,313	10
13	C-F-100-1	35.27	12,808	19,039	11
16	C-RL-100-1	33.21	12,057	17,197	12
7	F-100-1	32.12	11,663	18,674	13
10	RL-100-1	27.45	9,968	16,335	14
3	NS-100	14.50	5,266	7,383	15
2	Coastal	0.01	2	4,756	16

1/ Present Value Costs shown include costs for construction of coastal landscape measures. The final array of alternatives, as presented elsewhere in the report, do not include these costs since sustaining the current coastal landscape in this area appears to provide minimal contribution, if any, to reduction of risk from hurricane surge. Since deleting the coastal landscape costs affects all alternatives equally, the relative ranking of alternatives remains the same.

Planning Unit 3b

Average % Risk Reduction of Total Damages

For 100-yr to 2,000-yr Frequency Event Range Based on 2075 Population / Land Use

(Scenario 1: Low RSLR, High Employment, Dispersed Population - Low Uncertainty)

Rank	Scenario 1 Low RSLR High Employment Dispersed Population	Scenario 2 High RSLR High Employment Dispersed Population	Scenario 3 Low RSLR Business-as-Usual Compact Population	Scenario 4 High RSLR Business-as-Usual Compact Population
1	C-F-1000-1	C-F-1000-1	C-F-1000-1	C-F-1000-1
2	C-F-400-1	C-F-400-1	C-F-400-1	C-F-400-1
3	F-1000-1	F-1000-1	F-1000-1	F-1000-1
4	F-400-1	F-400-1	F-400-1	F-400-1
5	C-G-100-1	C-G-100-1	C-G-100-1	C-G-100-1
6	G-100-1	G-100-1	G-100-1	G-100-1
7	NS-1000	C-RL-400-1	NS-1000	C-RL-400-1
8	C-RL-400-1	NS-1000	C-RL-400-1	NS-1000
9	RL-400-1	RL-400-1	RL-400-1	RL-400-1
10	NS-400	C-F-100-1	NS-400	C-F-100-1
11	C-F-100-1	F-100-1	C-F-100-1	F-100-1
12	C-RL-100-1	C-RL-100-1	C-RL-100-1	C-RL-100-1
13	F-100-1	NS-400	F-100-1	NS-400
14	RL-100-1	RL-100-1	RL-100-1	RL-100-1
15	NS-100	NS-100	NS-100	NS-100
16	Coastal	Coastal	Coastal	Coastal

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Planning Unit 4

Sample Data Rankings and Evaluation Criteria Tables

Planning Unit 4 - Metric Data Summary

(Scenario 1 - Low Relative Sea Level Rise, High Employment, Dispersed Population; Low Uncertainty)

Plan No.	Alternative	Population Impacted	Residual Damages	Life Cycle Cost 1/	Construction Time	Employment Impacted	Indirect Environmental Impact Score	Direct Wetland Impacts	Historic Properties Protected	Historic Districts Protected	Archeo. Sites Protected
		Equiv. Annual #	Equiv. Annual $ Millions	Equiv. Annual $ Millions	Years	Equiv. Annual #	Unit-less Scale -8 to +8	Acres	# Properties	# Districts	# Sites
1	No Action	4,752	373	0	15	996	0	0	0	0	29
2	Coastal	4,753	373	551	15	996	0	0	2	0	58
3	NS-100	4,106	206	660	15	505	0	0	2	0	58
4	NS-400	4,024	169	727	15	369	0	0	2	0	58
5	NS-1000	3,911	156	796	15	321	0	0	2	0	58
6	G-100-1	3,672	307	1,163	10	851	-5	2,200	3	0	91
7	G-100-2	3,800	324	1,152	10	959	-5	1,800	0	0	90
8	G-400-3	3,899	324	1,150	10	958	-6	2,500	1	0	90
9	G-1000-3	3,832	319	1,174	10	935	-6	2,500	1	0	90
10	RL-100-1	4,704	352	689	10	982	0	100	0	0	60
11	RL-400-1	4,590	352	728	12	978	0	100	1	0	60
12	RL-1000-1	4,539	349	742	14	958	0	100	1	0	60
13	C-G-100-1	3,197	182	1,237	10	490	-5	2,200	3	0	91
14	C-G-100-2	3,325	194	1,226	10	590	-5	1,800	0	0	90
15	C-G-400-3	3,282	174	1,226	10	404	-6	2,500	1	0	90
16	C-G-1000-3	3,089	152	1,357	10	337	-6	2,500	1	0	90
17	C-RL-100-1	4,221	201	786	10	515	0	100	0	0	60
18	C-RL-400-1	4,020	173	813	12	396	0	100	1	0	109
19	C-RL-1000-1	3,849	161	921	14	338	0	100	1	0	60

1/ Equivalent Annual Costs shown include costs for construction of coastal landscape measures. The final array of alternatives, as presented elsewhere in the report, do not include these costs since sustaining the current coastal landscape in this area appears to provide minimal contribution, if any, to reduction of risk from hurricane surge. Since deleting the coastal landscape costs affects all alternatives equally, the relative ranking of alternatives remains the same.

Planning Unit 4 - Relative Ranking of Alternatives Based On Individual Metrics

(Scenario 1 - Low Relative Sea Level Rise, High Employment, Dispersed Population; Low Uncertainty)

Rank	Population Impacted	Residual Damages	Life Cycle Cost	Construction Time	Employment Impacted	Indirect Environmental Impact Score	Direct Wetland Impacts	Historic Properties Protected	Historic Districts Protected	Archeo. Sites Protected
1	C-G-1000-3	C-G-1000-3	No Action	RL-100-1	NS-1000	No Action	No Action	G-100-1	---	C-RL-400-1
2	C-G-100-1	NS-1000	Coastal	C-RL-100-1	C-G-1000-3	Coastal	Coastal	C-G-100-1	---	G-100-1
3	C-G-400-3	C-RL-1000-1	NS-100	G-400-3	C-RL-1000-1	NS-100	NS-100	Coastal	---	C-G-100-1
4	C-G-100-2	NS-400	RL-100-1	G-100-2	NS-400	RL-100-1	NS-400	NS-100	---	G-400-3
5	G-100-1	C-RL-400-1	NS-400	G-100-1	C-RL-400-1	NS-400	NS-1000	NS-400	---	G-100-2
6	G-100-2	C-G-400-3	RL-400-1	G-1000-3	C-G-400-3	RL-400-1	RL-100-1	NS-1000	---	G-1000-3
7	G-1000-3	C-G-100-1	RL-1000-1	C-G-400-3	C-G-100-1	RL-1000-1	RL-400-1	RL-400-1	---	C-G-400-3
8	C-RL-1000-1	C-G-100-2	C-RL-100-1	C-G-100-2	NS-100	C-RL-100-1	RL-1000-1	RL-1000-1	---	C-G-100-2
9	G-400-3	C-RL-100-1	NS-1000	C-G-100-1	C-RL-100-1	NS-1000	C-RL-100-1	C-RL-400-1	---	C-G-1000-3
10	NS-1000	NS-100	C-RL-400-1	C-G-1000-3	C-G-100-2	C-RL-400-1	C-RL-400-1	C-RL-1000-1	---	RL-100-1
11	C-RL-400-1	G-100-1	C-RL-1000-1	RL-400-1	G-100-1	C-RL-1000-1	C-RL-1000-1	G-400-3	---	RL-400-1
12	NS-400	G-1000-3	G-400-3	C-RL-400-1	G-1000-3	G-100-2	G-100-2	G-1000-3	---	RL-1000-1
13	NS-100	G-400-3	G-100-2	RL-1000-1	G-400-3	G-100-1	C-G-100-2	C-G-400-3	---	C-RL-100-1
14	C-RL-100-1	G-100-2	G-100-1	C-RL-1000-1	RL-1000-1	C-G-100-2	G-100-1	C-G-1000-3	---	C-RL-1000-1
15	RL-1000-1	RL-1000-1	G-1000-3	No Action	G-100-2	C-G-100-1	C-G-100-1	No Action	---	Coastal
16	RL-400-1	RL-400-1	C-G-400-3	Coastal	RL-400-1	G-400-3	G-400-3	RL-100-1	---	NS-100
17	RL-100-1	RL-100-1	C-G-100-2	NS-100	RL-100-1	G-1000-3	G-1000-3	C-RL-100-1	---	NS-400
18	No Action	Coastal	C-G-100-1	NS-400	Coastal	C-G-400-3	C-G-400-3	G-100-2	---	NS-1000
19	Coastal	No Action	C-G-1000-3	NS-1000	No Action	C-G-1000-3	C-G-1000-3	C-G-100-2	---	No Action

Planning Unit 4 - Multi-Criteria Decision Analysis (MCDA) Trend Analysis

(Scenario 1 - Low Relative Sea Level Rise, High Employment, Dispersed Population; Low Uncertainty)

Plan #	Alternative	Plan Rank By Each Respondant																										Total Ranking Score (All Respondants)
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	
5	NS-1000	3	1	1	1	2	1	1	3	1	3	5	1	3	4	3	1	1	1	2	2	5	1	3	1	1	1	1	53
4	NS-400	1	2	2	2	3	2	2	4	2	5	4	3	4	3	4	2	2	2	3	3	7	2	4	2	2	2	2	76
18	C-RL-400-1	4	3	4	3	1	3	3	1	4	1	10	4	1	2	2	4	4	3	1	1	8	4	2	3	4	4	4	88
3	NS-100	2	4	3	4	6	4	4	5	3	6	3	5	6	5	5	3	3	4	7	4	9	3	5	4	3	3	3	116
17	C-RL-100-1	5	5	6	6	5	5	6	2	6	2	9	6	2	1	1	6	6	6	4	5	10	6	1	6	6	6	6	135
19	C-RL-1000-1	6	6	5	5	4	6	5	6	5	4	11	2	5	6	6	5	5	5	5	6	6	5	6	5	5	5	5	145
2	Coastal	7	7	8	11	14	8	7	9	7	10	2	7	9	9	9	8	7	8	15	8	17	11	9	7	8	7	7	236
10	RL-100-1	8	8	13	14	11	7	8	7	10	7	6	10	7	7	7	9	10	9	12	7	18	14	7	8	11	10	9	254
11	RL-400-1	9	9	12	13	13	9	9	8	9	8	7	9	8	8	8	11	9	10	13	9	15	13	8	9	9	9	8	262
13	C-G-100-1	12	12	7	7	7	11	12	11	12	12	15	12	13	13	13	13	8	7	9	13	2	7	11	12	7	8	11	277
12	RL-1000-1	11	10	15	15	15	10	10	10	11	9	8	8	10	10	10	10	11	13	16	10	16	15	10	10	13	11	10	307
14	C-G-100-2	13	13	9	10	10	13	13	12	13	11	13	13	12	12	12	12	12	11	10	12	4	9	12	13	10	12	12	308
16	C-G-1000-3	16	14	10	8	8	14	14	13	15	14	19	14	14	15	15	14	13	12	6	14	1	8	13	14	12	13	15	338
1	No Action	10	11	17	19	19	12	11	15	8	13	1	11	11	11	11	7	16	16	19	11	19	17	16	11	16	15	13	356
15	C-G-400-3	15	15	11	9	9	15	15	14	14	15	18	15	15	14	14	15	14	14	8	15	3	10	14	15	14	14	16	360
6	G-100-1	14	16	14	12	12	16	16	16	16	16	14	16	17	17	17	17	15	15	11	17	11	12	15	16	15	16	14	403
7	G-100-2	17	17	16	16	16	17	17	17	17	17	12	17	16	16	16	16	17	17	14	16	12	16	17	17	17	17	17	437
9	G-1000-3	19	18	18	17	17	18	18	18	19	18	17	18	18	19	19	19	18	18	17	19	13	18	19	18	18	18	19	485
8	G-400-3	18	19	19	18	18	19	19	19	18	19	16	19	19	18	18	18	19	19	18	18	14	19	18	19	19	19	18	494

Planning Unit 4

MCDA Trend Analysis (Ranked by Total Ranking Scores - All Respondants)

Rank	Scenario 1 Low RSLR High Employment Dispersed Population	Scenario 2 High RSLR High Employment Dispersed Population	Scenario 3 Low RSLR Business-as-Usual Compact Population	Scenario 4 High RSLR Business-as-Usual Compact Population
1	NS-1000	NS-1000	NS-1000	NS-1000
2	NS-400	NS-400	NS-400	NS-400
3	C-RL-400-1	C-RL-400-1	C-RL-400-1	NS-100
4	NS-100	NS-100	NS-100	C-RL-400-1
5	C-RL-100-1	C-RL-1000-1	C-RL-100-1	C-RL-1000-1
6	C-RL-1000-1	C-RL-100-1	C-RL-1000-1	C-RL-100-1
7	Coastal	RL-100-1	Coastal	RL-100-1
8	RL-100-1	C-G-100-1	RL-100-1	C-G-100-1
9	RL-400-1	Coastal	RL-400-1	RL-400-1
10	C-G-100-1	RL-400-1	C-G-100-1	Coastal
11	RL-1000-1	RL-1000-1	RL-1000-1	RL-1000-1
12	C-G-100-2	C-G-100-2	C-G-100-2	C-G-100-2
13	C-G-1000-3	C-G-1000-3	C-G-1000-3	C-G-1000-3
14	No Action	C-G-400-3	No Action	C-G-400-3
15	C-G-400-3	No Action	C-G-400-3	No Action
16	G-100-1	G-100-1	G-100-1	G-100-1
17	G-100-2	G-100-2	G-100-2	G-100-2
18	G-1000-3	G-1000-3	G-1000-3	G-1000-3
19	G-400-3	G-400-3	G-400-3	G-400-3

Planning Unit 4

Evaluation Criteria Values

(Scenario 1, Low Relative Sea Level Rise, High Employment, Dispersed Population; Low Uncertainty)

Plan #	Alternative	Stakeholder (Multi-Criteria Decision Analysis)	Minimizing Environmental Impacts		Investment Decision (Efficiency) 1/			Minimizing Remaining Risk (Effectiveness)			Year 2025 Present Value Life Cycle Costs (2010-2075) ($Millions) 1/
Evaluation Criteria		Cumulative Ranking Score from MCDA Trend Analysis	Direct Wetland Impact	Indirect Impacts	Cost Efficiency	Total System Costs	Period of Analysis Cost Efficiency	Annualized Residual Damages	Period of Analysis Risk Reduction	Average % Risk Reduction	
(Units)		(Unit-less Weight)	(Acres)	(Unit-less Scale)	Ratio: Risk Reduction / Present Value Life Cycle Costs (PV LCC)	Annualized Life Cycle Costs + EA Residual Damages ($Millions)	Cost Efficiency Ratio: Event Freq Risk Reduction X Probability of Occurrence (2010-2075) / PV LCC	Average Annual Remaining Risk (Millions)	Event Freq Risk Reduction X Probability (2010-2075) ($Millions)	2075: 100-yr to 2,000-yr Frequency Events (Avg % of No Action Damages)	
2	Coastal	236	0	0	0.0000	923	0.0007	99.9	8	0.22	10,783
3	NS-100	116	0	0	0.0129	866	0.1136	55.2	1,468	24.18	12,925
4	NS-400	76	0	0	0.0144	895	0.1702	45.2	2,423	47.40	14,238
5	NS-1000	53	0	0	0.0139	952	0.1943	41.9	3,030	68.83	15,590
6	G-100-1	403	2,200	-5	0.0029	1,470	0.0547	82.4	1,245	30.95	22,773
7	G-100-2	437	1,800	-5	0.0022	1,476	0.0435	86.8	981	26.82	22,568
8	G-400-3	494	2,500	-6	0.0022	1,474	0.0393	86.8	884	19.06	22,515
9	G-1000-3	485	2,500	-6	0.0023	1,493	0.0523	85.6	1,203	33.81	22,989
10	RL-100-1	254	100	0	0.0016	1,041	0.0320	94.4	431	14.87	13,485
11	RL-400-1	262	100	0	0.0015	1,079	0.0217	94.2	309	5.49	14,254
12	RL-1000-1	307	100	0	0.0017	1,091	0.0432	93.5	628	20.24	14,540
13	C-G-100-1	277	2,200	-5	0.0079	1,419	0.0981	48.8	2,375	50.14	24,224
14	C-G-100-2	308	1,800	-5	0.0075	1,420	0.0903	52.0	2,170	46.67	24,021
15	C-G-400-3	360	2,500	-6	0.0083	1,399	0.1033	46.6	2,478	48.62	24,004
16	C-G-1000-3	338	2,500	-6	0.0083	1,509	0.1192	40.7	3,167	73.78	26,575
17	C-RL-100-1	135	100	0	0.0112	987	0.1189	53.9	1,829	37.75	15,391
18	C-RL-400-1	88	100	0	0.0125	986	0.1496	46.5	2,382	44.95	15,924
19	C-RL-1000-1	145	100	0	0.0117	1,082	0.1719	43.2	3,103	73.72	18,049

1/ Present Value and Equivalent Annual Costs include costs for construction of coastal landscape measures. The final array of alternatives, as presented elsewhere in the report, do not include these costs since sustaining the current coastal landscape in this area appears to provide minimal contribution, if any, to reduction of risk from hurricane surge. Since deleting the coastal landscape costs affects all alternatives equally, the relative ranking of alternatives remains the same.

Planning Unit 4

Evaluation Criteria Data Rankings

(Scenario 1, Low Relative Sea Level Rise, High Employment, Dispersed Population; Low Uncertainty)

Plan #	Alternative	Stakeholder (Multi-Criteria Decision Analysis)	Minimizing Environmental Impacts		Investment Decision (Efficiency) 1/			Minimizing Remaining Risk (Effectiveness)			Year 2025 Present Value Life Cycle Costs (2010-2075) ($Millions) 1/
Evaluation Criteria		Cumulative Ranking Score from MCDA Trend Analysis	Direct Wetland Impact	Indirect Impacts	Cost Efficiency	Total System Costs	Period of Analysis Cost Efficiency	Annualized Residual Damages	Period of Analysis Risk Reduction	Average % Risk Reduction	
	(Units)	(Unit-less Weight)	(Acres)	(Unit-less Scale)	Ratio: Risk Reduction / Present Value Life Cycle Costs (PV LCC)	Annualized Life Cycle Costs + EA Residual Damages ($Millions)	Cost Efficiency Ratio: Event Freq Risk Reduction X Probability of Occurrence (2010-2075) / PV LCC	Average Annual Remaining Risk (Millions)	Event Freq Risk Reduction X Probability (2010-2075) ($Millions)	2075: 100-yr to 2,000-yr Frequency Events (Avg % of No Action Damages)	
5	NS-1000	1	1	1	2	4	1	2	3	3	8
4	NS-400	2	1	1	1	2	3	4	5	6	4
3	NS-100	4	1	1	3	1	7	10	10	13	2
19	C-RL-1000-1	6	5	15	5	9	2	3	2	2	10
18	C-RL-400-1	3	5	15	4	5	4	5	6	8	9
17	C-RL-100-1	5	5	15	6	8	6	9	9	9	7
16	C-G-1000-3	13	15	15	7	18	5	1	1	1	18
15	C-G-400-3	14	15	11	8	11	8	6	4	5	15
13	C-G-100-1	10	13	11	9	12	9	7	7	4	17
2	Coastal	7	1	1	18	3	18	18	18	18	1
10	RL-100-1	8	5	1	16	7	16	17	16	16	3
14	C-G-100-2	12	11	11	10	13	10	8	8	7	16
6	G-100-1	15	13	1	11	14	11	11	11	11	13
11	RL-400-1	9	5	1	17	8	17	16	17	17	5
12	RL-1000-1	11	5	11	15	10	14	15	15	14	6
7	G-100-2	16	11	1	14	16	13	14	13	12	12
9	G-1000-3	17	15	1	12	17	12	12	12	10	14
8	G-400-3	18	15	1	13	15	15	13	14	15	11

Planning Unit 3b

Cost Efficiency Analysis

(Scenario 1 - LRSLR, High Employment, Dispersed Population; Low Uncertainty)

Plan #	Alternative	Present Value Life-Cycle Costs ($ Millions) 1/	Risk Reduction Equivalent Annual ($ Millions)	Cost Efficiency Factor Risk Red / PV Costs	Rank
4	NS-400	14,238	204	0.0144	1
5	NS-1000	15,590	217	0.0139	2
3	NS-100	12,925	167	0.0129	3
18	C-RL-400-1	15,924	200	0.0125	4
19	C-RL-1000-1	18,049	212	0.0117	5
17	C-RL-100-1	15,391	172	0.0112	6
16	C-G-1000-3	26,575	221	0.0083	7
15	C-G-400-3	24,004	199	0.0083	8
13	C-G-100-1	24,224	191	0.0079	9
14	C-G-100-2	24,021	179	0.0075	10
6	G-100-1	22,773	66	0.0029	11
9	G-1000-3	22,989	54	0.0023	12
8	G-400-3	22,515	49	0.0022	13
7	G-100-2	22,568	49	0.0022	14
12	RL-1000-1	14,540	24	0.0017	15
10	RL-100-1	13,485	21	0.0016	16
11	RL-400-1	14,254	22	0.0015	17
2	Coastal	10,783	0	0.0000	18

1/ Present Value Costs shown include costs for construction of coastal landscape measures. The final array of alternatives, as presented elsewhere in the report, do not include these costs since sustaining the current coastal landscape in this area appears to provide minimal contribution, if any, to reduction of risk from hurricane surge. Since deleting the coastal landscape costs affects all alternatives equally, the relative ranking of alternatives remains the same.

Planning Unit 4

Cost Efficiency Rankings

Rank	Scenario 1 Low RSLR High Employment Dispersed Population	Scenario 2 High RSLR High Employment Dispersed Population	Scenario 3 Low RSLR Business-as-Usual Compact Population	Scenario 4 High RSLR Business-as-Usual Compact Population
1	NS-400	NS-400	NS-400	NS-400
2	NS-1000	NS-1000	NS-1000	NS-1000
3	NS-100	NS-100	NS-100	NS-100
4	C-RL-400-1	C-RL-400-1	C-RL-400-1	C-RL-400-1
5	C-RL-1000-1	C-RL-1000-1	C-RL-1000-1	C-RL-1000-1
6	C-RL-100-1	C-RL-100-1	C-RL-100-1	C-RL-100-1
7	C-G-1000-3	C-G-400-3	C-G-1000-3	C-G-1000-3
8	C-G-400-3	C-G-1000-3	C-G-400-3	C-G-400-3
9	C-G-100-1	C-G-100-1	C-G-100-1	C-G-100-1
10	C-G-100-2	C-G-100-2	C-G-100-2	C-G-100-2
11	G-100-1	G-100-1	G-100-1	G-100-1
12	G-1000-3	G-1000-3	G-1000-3	G-1000-3
13	G-400-3	G-400-3	RL-1000-1	RL-1000-1
14	G-100-2	G-100-2	G-400-3	G-400-3
15	RL-1000-1	RL-1000-1	G-100-2	G-100-2
16	RL-100-1	RL-100-1	RL-400-1	RL-400-1
17	RL-400-1	RL-400-1	RL-100-1	RL-100-1
18	Coastal	Coastal	Coastal	Coastal

Planning Unit 4

Total System Costs Analysis

(Scenario 1 - LRSLR, High Employment, Dispersed Population; Low Uncertainty)

Plan #	Alternative	Equivalent Annual Life-Cycle Costs ($Millions) 1/	With Project Residual Damages ($ Millions)	Total System Costs ($ Millions)	Rank
3	NS-100	660	206	866	1
4	NS-400	727	169	895	2
2	Coastal	551	373	923	3
5	NS-1000	796	156	952	4
18	C-RL-400-1	813	173	986	5
17	C-RL-100-1	786	201	987	6
10	RL-100-1	689	352	1,041	7
11	RL-400-1	728	352	1,079	8
19	C-RL-1000-1	921	161	1,082	9
12	RL-1000-1	742	349	1,091	10
15	C-G-400-3	1,226	174	1,399	11
13	C-G-100-1	1,237	182	1,419	12
14	C-G-100-2	1,226	194	1,420	13
6	G-100-1	1,163	307	1,470	14
8	G-400-3	1,150	324	1,474	15
7	G-100-2	1,152	324	1,476	16
9	G-1000-3	1,174	319	1,493	17
16	C-G-1000-3	1,357	152	1,509	18

1/ Equivalent Annual Life-Cycle Costs shown include costs for construction of coastal landscape measures. The final array of alternatives, as presented elsewhere in the report, do not include these costs since sustaining the current coastal landscape in this area appears to provide minimal contribution, if any, to reduction of risk from hurricane surge. Since deleting the coastal landscape costs affects all alternatives equally, the relative ranking of alternatives remains the same.

Planning Unit 4

Total System Costs Rankings

Rank	Scenario 1 Low RSLR High Employment Dispersed Population	Scenario 2 High RSLR High Employment Dispersed Population	Scenario 3 Low RSLR Business-as-Usual Compact Population	Scenario 4 High RSLR Business-as-Usual Compact Population
1	NS-100	NS-100	NS-100	NS-100
2	NS-400	NS-400	NS-400	NS-400
3	Coastal	NS-1000	Coastal	NS-1000
4	NS-1000	Coastal	NS-1000	Coastal
5	C-RL-400-1	C-RL-400-1	C-RL-100-1	C-RL-100-1
6	C-RL-100-1	C-RL-100-1	C-RL-400-1	C-RL-400-1
7	RL-100-1	RL-100-1	RL-100-1	RL-100-1
8	RL-400-1	C-RL-1000-1	C-RL-1000-1	C-RL-1000-1
9	C-RL-1000-1	RL-400-1	RL-400-1	RL-400-1
10	RL-1000-1	RL-1000-1	RL-1000-1	RL-1000-1
11	C-G-400-3	C-G-400-3	C-G-100-1	C-G-400-3
12	C-G-100-1	C-G-100-1	C-G-100-2	C-G-100-1
13	C-G-100-2	C-G-100-2	C-G-400-3	C-G-100-2
14	G-100-1	G-100-1	G-400-3	C-G-1000-3
15	G-400-3	G-400-3	G-100-1	G-100-1
16	G-100-2	G-100-2	G-100-2	G-400-3
17	G-1000-3	G-1000-3	C-G-1000-3	G-100-2
18	C-G-1000-3	C-G-1000-3	G-1000-3	G-1000-3

Planning Unit 4

Period of Analysis Cost Efficiency

(2075 Risk Reduction X Probability (2010-2075) / Present Value Costs For Frequency Events Included in Economic Evaluation)

(Scenario 1: Low RSLR, High Employment, Dispersed Population - Low Uncertainty)

Plan #	Alternative	Remaining Damages by Frequency ($Millions)					Total Risk Reduction X Probabilty 2010-2075 ($Millions)	Present Value Life-Cycle Costs ($ Millions) 1/	Cost Efficiency Ratio Total Risk Reduction / PV Costs	Rank
		10-yr	100-yr	400-yr	1,000-yr	2,000-yr				
No Action Damages ($ Million)		472	3,034	6,592	10,316	12,755				
5	NS-1000	121	458	935	3,146	8,278	3,030	15,590	0.19	1
19	C-RL-1000-1	154	456	836	2,456	6,837	3,103	18,049	0.17	2
4	NS-400	142	504	2,214	7,707	10,905	2,423	14,238	0.17	3
18	C-RL-400-1	175	502	1,585	8,801	12,031	2,382	15,924	0.15	4
16	C-G-1000-3	122	304	864	3,220	6,445	3,167	26,575	0.12	5
17	C-RL-100-1	183	1,012	4,739	7,608	8,928	1,829	15,391	0.12	6
3	NS-100	151	1,249	5,340	9,206	11,720	1,468	12,925	0.11	7
15	C-G-400-3	173	469	1,384	8,519	11,032	2,478	24,004	0.10	8
13	C-G-100-1	157	520	3,172	7,198	8,213	2,375	24,224	0.10	9
14	C-G-100-2	207	713	3,488	7,412	8,298	2,170	24,021	0.09	10
6	G-100-1	394	1,867	4,220	8,170	9,113	1,245	22,773	0.05	11
9	G-1000-3	469	2,137	3,628	6,998	9,115	1,203	22,989	0.05	12
7	G-100-2	464	2,113	4,588	8,435	9,247	981	22,568	0.04	13
12	RL-1000-1	504	2,661	4,990	7,735	10,289	628	14,540	0.04	14
8	G-400-3	469	2,137	3,645	10,277	12,551	884	22,515	0.04	15
10	RL-100-1	504	2,666	5,958	8,701	9,937	431	13,485	0.03	16
11	RL-400-1	504	2,661	5,007	11,014	13,725	309	14,254	0.02	17
2	Coastal	472	3,023	6,577	10,304	12,731	8	10,783	0.00	18

1/ Present Value Costs shown include costs for construction of coastal landscape measures. The final array of alternatives, as presented elsewhere in the report, do not include these costs since sustaining the current coastal landscape in this area appears to provide minimal contribution, if any, to reduction of risk from hurricane surge. Since deleting the coastal landscape costs affects all alternatives equally, the relative ranking of alternatives remains the same.

Planning Unit 4

Period of Analysis Cost Efficiency

(2075 Risk Reduction X Probability (2010 - 2075) / Present Value Costs Rankings For Frequency Events Included in Economic Evaluation)

Rank	Scenario 1	Scenario 2	Scenario 3	Scenario 4
	Low RSLR High Employment Dispersed Population	High RSLR High Employment Dispersed Population	Low RSLR Business-as-Usual Compact Population	High RSLR Business-as-Usual Compact Population
1	NS-1000	NS-1000	NS-1000	NS-1000
2	C-RL-1000-1	C-RL-1000-1	NS-400	NS-400
3	NS-400	NS-400	C-RL-1000-1	C-RL-1000-1
4	C-RL-400-1	C-RL-400-1	C-RL-400-1	C-RL-400-1
5	C-G-1000-3	C-G-1000-3	NS-100	C-G-1000-3
6	C-RL-100-1	C-RL-100-1	C-RL-100-1	C-RL-100-1
7	NS-100	C-G-400-3	C-G-1000-3	NS-100
8	C-G-400-3	C-G-100-1	C-G-400-3	C-G-400-3
9	C-G-100-1	NS-100	C-G-100-1	C-G-100-1
10	C-G-100-2	C-G-100-2	C-G-100-2	C-G-100-2
11	G-100-1	G-100-1	RL-1000-1	G-100-1
12	G-1000-3	G-1000-3	G-1000-3	G-1000-3
13	G-100-2	G-100-2	G-100-1	RL-1000-1
14	RL-1000-1	G-400-3	RL-100-1	G-100-2
15	G-400-3	RL-1000-1	G-100-2	G-400-3
16	RL-100-1	RL-100-1	G-400-3	RL-100-1
17	RL-400-1	RL-400-1	RL-400-1	RL-400-1
18	Coastal	Coastal	Coastal	Coastal

Planning Unit 4

Residual Damages (Remaining Risk) Analysis

(Scenario 1: Low RSLR, High Employment, Dispersed Population - Low Uncertainty)

Plan #	Alternative	No Action Residual Damages ($Millions)	With Project Residual Damages ($ Millions)	% of No Action Damages	Rank
16	C-G-1000-3	373	152	40.7	1
5	NS-1000	373	156	41.9	2
19	C-RL-1000-1	373	161	43.2	3
4	NS-400	373	169	45.2	4
18	C-RL-400-1	373	173	46.5	5
15	C-G-400-3	373	174	46.6	6
13	C-G-100-1	373	182	48.8	7
14	C-G-100-2	373	194	52.0	8
17	C-RL-100-1	373	201	53.9	9
3	NS-100	373	206	55.2	10
6	G-100-1	373	307	82.4	11
9	G-1000-3	373	319	85.6	12
8	G-400-3	373	324	86.8	13
7	G-100-2	373	324	86.8	14
12	RL-1000-1	373	349	93.5	15
11	RL-400-1	373	352	94.2	16
10	RL-100-1	373	352	94.4	17
2	Coastal	373	373	99.9	18

Planning Unit 4

Residual Damages (Remaining Risk) Rankings

Rank	Scenario 1 Low RSLR High Employment Dispersed Population	Scenario 2 High RSLR High Employment Dispersed Population	Scenario 3 Low RSLR Business-as-Usual Compact Population	Scenario 4 High RSLR Business-as-Usual Compact Population
1	C-G-1000-3	NS-1000	NS-1000	NS-1000
2	NS-1000	C-G-1000-3	C-G-1000-3	C-G-1000-3
3	C-RL-1000-1	C-RL-1000-1	C-RL-1000-1	NS-400
4	NS-400	NS-400	NS-400	C-RL-1000-1
5	C-RL-400-1	C-G-400-3	C-RL-400-1	C-G-400-3
6	C-G-400-3	C-RL-400-1	C-G-400-3	C-RL-400-1
7	C-G-100-1	C-G-100-1	C-G-100-1	C-G-100-1
8	C-G-100-2	C-G-100-2	C-G-100-2	C-G-100-2
9	C-RL-100-1	NS-100	NS-100	NS-100
10	NS-100	C-RL-100-1	C-RL-100-1	C-RL-100-1
11	G-100-1	G-100-1	G-100-1	G-100-1
12	G-1000-3	G-1000-3	G-1000-3	G-1000-3
13	G-400-3	G-400-3	G-400-3	G-400-3
14	G-100-2	G-100-2	G-100-2	G-100-2
15	RL-1000-1	RL-1000-1	RL-1000-1	RL-1000-1
16	RL-400-1	RL-400-1	RL-400-1	RL-400-1
17	RL-100-1	RL-100-1	RL-100-1	RL-100-1
18	Coastal	Coastal	Coastal	Coastal

Planning Unit 4

Period of Analysis Risk Reduction

(2075 Risk Reduction X Probability (2010-2075)

For Frequency Events Included in Economic Evaluation)

(Scenario 1: Low RSLR, High Employment, Dispersed Population - Low Uncertainty)

Plan #	Alternative	Remaining Damages by Frequency ($Millions)					Total Risk Reduction X Probability 2010-2075 ($Million)	Rank
		10-yr	100-yr	400-yr	1,000-yr	2,000-yr		
No Action Damages ($ Million)		472	3,034	6,592	10,316	12,755		
16	C-G-1000-3	122	304	864	3,220	6,445	3,167	1
19	C-RL-1000-1	154	456	836	2,456	6,837	3,103	2
5	NS-1000	121	458	935	3,146	8,278	3,030	3
15	C-G-400-3	173	469	1,384	8,519	11,032	2,478	4
4	NS-400	142	504	2,214	7,707	10,905	2,423	5
18	C-RL-400-1	175	502	1,585	8,801	12,031	2,382	6
13	C-G-100-1	157	520	3,172	7,198	8,213	2,375	7
14	C-G-100-2	207	713	3,488	7,412	8,298	2,170	8
17	C-RL-100-1	183	1,012	4,739	7,608	8,928	1,829	9
3	NS-100	151	1,249	5,340	9,206	11,720	1,468	10
6	G-100-1	394	1,867	4,220	8,170	9,113	1,245	11
9	G-1000-3	469	2,137	3,628	6,998	9,115	1,203	12
7	G-100-2	464	2,113	4,588	8,435	9,247	981	13
8	G-400-3	469	2,137	3,645	10,277	12,551	884	14
12	RL-1000-1	504	2,661	4,990	7,735	10,289	628	15
10	RL-100-1	504	2,666	5,958	8,701	9,937	431	16
11	RL-400-1	504	2,661	5,007	11,014	13,725	309	17
2	Coastal	472	3,023	6,577	10,304	12,731	8	18

Planning Unit 4

Period of Analysis Risk Reduction

(2075 Risk Reduction X Probability (2010 - 2075) Rankings

For Frequency Events Included in Economic Evaluation)

Rank	Scenario 1	Scenario 2	Scenario 3	Scenario 4
	Low RSLR High Employment Dispersed Population	High RSLR High Employment Dispersed Population	Low RSLR Business-as-Usual Compact Population	High RSLR Business-as-Usual Compact Population
1	C-G-1000-3	C-G-1000-3	C-G-1000-3	C-G-1000-3
2	C-RL-1000-1	C-RL-1000-1	C-RL-1000-1	C-RL-1000-1
3	NS-1000	NS-1000	NS-1000	NS-1000
4	C-G-400-3	C-G-400-3	NS-400	C-G-400-3
5	NS-400	C-G-100-1	C-G-400-3	C-RL-400-1
6	C-RL-400-1	C-RL-400-1	C-RL-400-1	NS-400
7	C-G-100-1	NS-400	C-G-100-1	C-G-100-1
8	C-G-100-2	C-G-100-2	C-G-100-2	C-G-100-2
9	C-RL-100-1	C-RL-100-1	C-RL-100-1	C-RL-100-1
10	NS-100	G-100-1	NS-100	NS-100
11	G-100-1	G-1000-3	G-1000-3	G-100-1
12	G-1000-3	NS-100	G-100-1	G-1000-3
13	G-100-2	G-100-2	G-100-2	G-100-2
14	G-400-3	G-400-3	RL-1000-1	G-400-3
15	RL-1000-1	RL-1000-1	G-400-3	RL-1000-1
16	RL-100-1	RL-100-1	RL-100-1	RL-100-1
17	RL-400-1	RL-400-1	RL-400-1	RL-400-1
18	Coastal	Coastal	Coastal	Coastal

Planning Unit 4

Average % Risk Reduction of Total Damages

For 100-yr to 2,000-yr Frequency Event Range Based on 2075 Population / Land Use

(Scenario 1: Low RSLR, High Employment, Dispersed Population - Low Uncertainty)

Plan #	Alternative	Average % Risk Reduction for 100-yr to 2,000-yr Frequency Events	Average Risk Reduction for 100-yr to 2,000-yr Frequency Events ($ Millions)	Present Value Life Cycle Costs ($ Millions) 1/	Rank
Total No Action Residual Damages 100-yr to 2,000-yr Freq Events ($ Million)		32,697			
16	C-G-1000-3	73.78	24,124	26,575	1
19	C-RL-1000-1	73.72	24,103	18,049	2
5	NS-1000	68.83	22,506	15,590	3
13	C-G-100-1	50.14	16,395	24,224	4
15	C-G-400-3	48.62	15,896	24,004	5
4	NS-400	47.40	15,500	14,238	6
14	C-G-100-2	46.67	15,259	24,021	7
18	C-RL-400-1	44.95	14,696	15,924	8
17	C-RL-100-1	37.75	12,343	15,391	9
9	G-1000-3	33.81	11,054	22,989	10
6	G-100-1	30.95	10,119	22,773	11
7	G-100-2	26.62	8,702	22,568	12
3	NS-100	24.18	7,906	12,925	13
12	RL-1000-1	20.24	6,616	14,540	14
8	G-400-3	19.06	6,233	22,515	15
10	RL-100-1	14.87	4,863	13,485	16
11	RL-400-1	5.49	1,795	14,254	17
2	Coastal	0.22	71	10,783	18

1/ Present Value Costs shown include costs for construction of coastal landscape measures. The final array of alternatives, as presented elsewhere in the report, do not include these costs since sustaining the current coastal landscape in this area appears to provide minimal contribution, if any, to reduction of risk from hurricane surge. Since deleting the coastal landscape costs affects all alternatives equally, the relative ranking of alternatives remains the same.

Planning Unit 4
Average % Risk Reduction of Total Damages
For 100-yr to 2,000-yr Frequency Event Range Based on 2075 Population / Land Use
(Scenario 1: Low RSLR, High Employment, Dispersed Population - Low Uncertainty)

Rank	Scenario 1 Low RSLR High Employment Dispersed Population	Scenario 2 High RSLR High Employment Dispersed Population	Scenario 3 Low RSLR Business-as-Usual Compact Population	Scenario 4 High RSLR Business-as-Usual Compact Population
1	C-G-1000-3	C-G-1000-3	C-RL-1000-1	C-G-1000-3
2	C-RL-1000-1	C-RL-1000-1	C-G-1000-3	C-RL-1000-1
3	NS-1000	NS-1000	NS-1000	NS-1000
4	C-G-100-1	C-G-100-1	NS-400	C-G-400-3
5	C-G-400-3	C-G-400-3	C-G-400-3	C-G-100-1
6	NS-400	C-G-100-2	C-RL-400-1	C-RL-400-1
7	C-G-100-2	C-RL-400-1	C-G-100-1	C-G-100-2
8	C-RL-400-1	NS-400	C-G-100-2	NS-400
9	C-RL-100-1	G-1000-3	C-RL-100-1	C-RL-100-1
10	G-1000-3	G-100-1	NS-100	NS-100
11	G-100-1	C-RL-100-1	G-1000-3	G-1000-3
12	G-100-2	G-100-2	G-100-1	G-100-1
13	NS-100	G-400-3	RL-1000-1	G-100-2
14	RL-1000-1	RL-1000-1	G-100-2	RL-1000-1
15	G-400-3	RL-100-1	RL-100-1	G-400-3
16	RL-100-1	NS-100	G-400-3	RL-100-1
17	RL-400-1	RL-400-1	RL-400-1	RL-400-1
18	Coastal	Coastal	Coastal	Coastal

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Secondary Evaluation Criteria

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Participation in Nonstructural Measures
All Planning Units

Sample Plan Rankings with Various Levels of Participation

Planning Unit 1

Residual Damages (Remaining Risk) Rankings - Based on Varying Levels of Nonstructural Participation

(Scenario 1 - Low Relative Sea Level Rise, High Employment, Dispersed Population; Low Uncertainty)

Rank	100%	90%	80%	70%	60%	50%	40%	30%	20%	10%
1	NS-1000	NS-1000	NS-1000	NS-1000	NS-1000	NS-1000	C-LP-1b-1000-2	C-LP-1b-1000-2	C-LP-1b-1000-2	C-LP-1b-1000-2
2	NS-0400	NS-0400	NS-0400	NS-0400	NS-0400	C-LP-1b-1000-2	C-HL-1b-0400-2	C-HL-1b-0400-2	C-HL-1b-0400-2	C-HL-1b-0400-2
3	C-LP-1b-1000-1	C-LP-1b-1000-1	C-LP-1b-1000-1	C-LP-1b-1000-2	C-LP-1b-1000-2	C-HL-1b-0400-2	C-HL-1b-0400-3	C-HL-1b-0400-3	C-HL-1b-0400-3	LP-1b-1000-2
4	C-LP-1b-0400-1	C-LP-1b-0400-1	C-LP-1b-1000-2	C-LP-1b-1000-1	C-HL-1b-0400-2	C-HL-1b-0400-3	C-LP-1b-0400-3	C-LP-1b-0400-3	C-LP-1b-0400-3	HL-1b-0400-2
5	C-LP-1b-1000-2	C-LP-1b-1000-2	C-LP-1b-0400-1	C-HL-1b-0400-2	C-HL-1b-0400-3	C-LP-1b-0400-3	C-LP-1b-1000-1	LP-1b-1000-2	LP-1b-1000-2	C-HL-1b-0400-3
6	C-HL-1b-0400-3	C-HL-1b-0400-3	C-HL-1b-0400-3	C-HL-1b-0400-3	C-LP-1b-0400-3	C-LP-1b-1000-1	LP-1b-1000-2	HL-1b-0400-2	HL-1b-0400-2	C-LP-1b-0400-3
7	C-LP-1b-0400-3	C-LP-1b-0400-3	C-LP-1b-0400-3	C-LP-1b-0400-3	C-LP-1b-1000-1	C-LP-1b-0400-1	HL-1b-0400-2	HL-1b-0400-3	HL-1b-0400-3	HL-1b-0400-3
8	C-HL-1b-0400-2	C-HL-1b-0400-2	C-HL-1b-0400-2	C-LP-1b-0400-1	C-LP-1b-0400-1	NS-0400	C-LP-1b-0400-1	LP-1b-0400-3	LP-1b-0400-3	LP-1b-0400-3
9	NS-0100	C-LP-1a-0100-3	C-LP-1a-0100-2	C-LP-1a-0100-2	C-LP-1a-0100-2	LP-1b-1000-2	C-LP-1a-0100-2	C-LP-1b-1000-1	C-LP-1a-0100-2	C-LP-1a-0100-2
10	C-LP-1a-0100-1	C-LP-1a-0100-2	C-LP-1a-0100-3	C-LP-1a-0100-3	C-LP-1a-0100-3	C-LP-1a-0100-2	HL-1b-0400-3	C-LP-1a-0100-2	C-LP-1a-0100-3	C-LP-1a-0100-3
11	C-LP-1a-0100-3	C-LP-1a-0100-1	C-LP-1a-0100-1	C-LP-1a-0100-1	LP-1b-1000-2	HL-1b-0400-2	C-LP-1a-0100-3	C-LP-1a-0100-3	C-LP-1b-1000-1	LP-1a-0100-2
12	C-LP-1a-0100-2	NS-0100	LP-1b-1000-2	LP-1b-1000-2	HL-1b-0400-2	C-LP-1a-0100-3	LP-1b-0400-3	C-LP-1b-0400-1	C-LP-1b-0400-1	LP-1a-0100-3
13	LP-1b-1000-2	LP-1b-1000-2	HL-1b-0400-2	HL-1b-0400-2	C-LP-1a-0100-1	HL-1b-0400-3	NS-1000	LP-1a-0100-2	LP-1a-0100-2	C-LP-1b-1000-1
14	HL-1b-0400-2	HL-1b-0400-2	NS-0100	HL-1b-0400-3	HL-1b-0400-3	LP-1b-0400-3	C-LP-1a-0100-1	LP-1a-0100-3	LP-1a-0100-3	C-LP-1b-0400-1
15	HL-1b-0400-3	HL-1b-0400-3	HL-1b-0400-3	LP-1b-0400-3	LP-1b-0400-3	C-LP-1a-0100-1	LP-1a-0100-2	C-LP-1a-0100-1	C-LP-1a-0100-1	LP-1b-1000-1
16	LP-1b-0400-3	LP-1b-0400-3	LP-1b-0400-3	LP-1a-0100-2	LP-1a-0100-2	LP-1a-0100-2	NS-0400	LP-1b-1000-1	LP-1b-1000-1	LP-1b-0400-1
17	LP-1a-0100-2	LP-1a-0100-2	LP-1a-0100-2	NS-0100	LP-1a-0100-3	LP-1a-0100-3	LP-1a-0100-3	LP-1b-0400-1	LP-1b-0400-1	C-LP-1a-0100-1
18	LP-1a-0100-3	LP-1a-0100-3	LP-1a-0100-3	LP-1a-0100-3	LP-1b-1000-1	LP-1b-1000-1	LP-1b-1000-1	NS-1000	LP-1a-0100-1	LP-1a-0100-1
19	C-HL-1a-0100-3	LP-1b-1000-1	LP-1b-1000-1	LP-1b-1000-1	LP-1b-0400-1	LP-1b-0400-1	LP-1b-0400-1	LP-1a-0100-1	C-HL-1a-0100-2	C-HL-1a-0100-2
20	C-HL-1a-0100-2	LP-1b-0400-1	LP-1b-0400-1	LP-1b-0400-1	NS-0100	LP-1a-0100-1	LP-1a-0100-1	NS-0400	C-HL-1a-0100-3	HL-1a-0100-2
21	LP-1b-1000-1	C-HL-1a-0100-3	C-HL-1a-0100-3	C-HL-1a-0100-2	C-HL-1a-0100-2	C-HL-1a-0100-2	C-HL-1a-0100-2	C-HL-1a-0100-2	HL-1a-0100-2	C-HL-1a-0100-3
22	LP-1b-0400-1	C-HL-1a-0100-2	C-HL-1a-0100-2	C-HL-1a-0100-3	LP-1a-0100-1	C-HL-1a-0100-3	C-HL-1a-0100-3	C-HL-1a-0100-3	HL-1a-0100-3	HL-1a-0100-3
23	LP-1a-0100-1	LP-1a-0100-1	LP-1a-0100-1	LP-1a-0100-1	C-HL-1a-0100-3	NS-0100	HL-1a-0100-2	HL-1a-0100-2	NS-1000	NS-1000
24	HL-1a-0100-2	HL-1a-0100-2	HL-1a-0100-2	HL-1a-0100-2	HL-1a-0100-2	HL-1a-0100-2	NS-0100	HL-1a-0100-3	NS-0400	NS-0400
25	HL-1a-0100-3	HL-1a-0100-3	HL-1a-0100-3	HL-1a-0100-3	HL-1a-0100-3	HL-1a-0100-3	HL-1a-0100-3	NS-0100	NS-0100	NS-0100
26	Coastal	Coastal	Coastal	Coastal	Coastal	Coastal	Coastal	Coastal	Coastal	Coastal

Pla[illegible]ng Unit 1

Residual Damages (Remaining Risk) - Based on Varying Levels of Nonstructural Participation

(Scenario 1 - Low Relative Sea Level Rise, High Employment, Dispersed Population; Low Uncertainty)

Plan #	Alternative	Equivalent Annual Residual Damages ($ Millions) Based on % Participation in Nonstructural Plans or Plan Components									
		100%	90%	80%	70%	60%	50%	40%	30%	20%	10%
2	Coastal	1,106	1,106	1,106	1,106	1,106	1,106	1,106	1,106	1,106	1,106
3	NS-0100	732	770	807	844	882	919	957	994	1,031	1,068
4	NS-0400	463	527	591	656	720	784	849	913	977	1,042
5	NS-1000	384	456	528	600	673	745	817	889	961	1,034
6	HL-1a-0100-2	950	950	950	950	950	950	950	950	950	950
7	HL-1a-0100-3	961	961	961	961	961	961	961	961	961	961
8	HL-1b-0400-2	797	797	797	797	797	797	797	797	797	797
9	HL-1b-0400-3	810	810	810	810	810	810	810	810	810	810
10	LP-1a-0100-1	904	904	904	904	904	904	904	904	904	904
11	LP-1a-0100-2	842	842	842	842	842	842	842	842	842	842
12	LP-1a-0100-3	850	850	850	850	850	850	850	850	850	850
13	LP-1b-0400-1	878	878	878	878	878	878	878	878	878	878
14	LP-1b-0400-3	811	811	811	811	811	811	811	811	811	811
15	LP-1b-1000-1	874	874	874	874	874	874	874	874	874	874
16	LP-1b-1000-2	796	796	796	796	796	796	796	796	796	796
17	C-HL-1a-0100-2	873	880	888	896	903	911	919	927	934	942
18	C-HL-1a-0100-3	870	879	888	897	906	915	924	934	943	952
19	C-HL-1b-0400-2	708	717	726	735	744	753	761	770	779	788
20	C-HL-1b-0400-3	704	715	725	736	746	757	768	778	789	799
21	C-LP-1a-0100-1	744	760	776	792	808	824	840	856	872	888
22	C-LP-1a-0100-2	751	760	769	778	787	797	806	815	824	833
23	C-LP-1a-0100-3	750	760	770	780	790	800	810	820	830	840
24	C-LP-1b-0400-1	684	704	723	743	762	781	801	820	840	859
25	C-LP-1b-0400-3	705	715	726	737	747	758	769	779	790	800
26	C-LP-1b-1000-1	667	688	709	729	750	771	791	812	833	853
27	C-LP-1b-1000-2	697	707	717	727	737	746	756	766	776	786

Planning Unit 2

Residual Damages (Remaining Risk) Rankings - Based on Varying Levels of Nonstructural Participation

(Scenario 1 - Low Relative Sea Level Rise, High Employment, Dispersed Population; Low Uncertainty)

Rank	100%	90%	80%	70%	60%	50%	40%	30%	20%	10%
1	NS-1000	NS-1000	NS-1000	NS-1000	NS-1000	NS-1000	NS-1000	C-G-100-4	C-G-100-4	C-G-100-4
2	NS-400	NS-400	NS-400	NS-400	NS-400	NS-400	NS-400	C-R-400-3	C-R-400-3	G-100-4
3	C-R-400-3	C-R-400-3	C-R-400-3	C-R-400-3	C-R-400-3	C-G-100-4	C-G-100-4	NS-1000	G-100-4	C-R-400-3
4	C-WBI-400-1	C-G-100-4	C-G-100-4	C-G-100-4	C-G-100-4	C-R-400-3	C-R-400-3	C-G-100-1	C-G-100-1	C-G-100-1
5	C-G-100-4	C-WBI-400-1	C-G-1000-4	C-G-100-1	C-G-100-1	C-G-100-1	C-G-100-1	C-G-1000-4	C-G-1000-4	C-G-1000-4
6	C-R-1000-4	C-R-1000-4	C-G-100-1	C-G-1000-4	C-G-1000-4	C-G-1000-4	C-G-1000-4	NS-400	C-G-400-4	C-G-400-4
7	C-G-1000-4	C-G-1000-4	C-WBI-400-1	C-R-1000-4	C-G-400-4	C-G-400-4	C-G-400-4	C-G-400-4	R-400-3	R-400-3
8	C-G-100-1	C-G-100-1	C-R-1000-4	C-G-400-4	C-R-1000-4	C-R-1000-4	C-R-1000-4	G-100-4	C-R-1000-4	G-100-1
9	C-R-400-2	C-G-400-4	C-G-400-4	C-WBI-400-1	C-R-400-4	C-R-400-4	G-100-4	C-R-1000-4	G-100-1	G-1000-4
10	C-G-400-4	C-R-400-4	C-R-400-4	C-R-400-4	C-WBI-400-1	C-WBI-400-1	C-R-400-4	C-R-400-4	C-R-400-4	G-400-4
11	C-R-400-4	C-R-400-2	C-R-400-2	C-R-400-2	C-R-400-2	C-R-400-2	C-R-400-2	R-400-3	NS-1000	C-R-1000-4
12	NS-100	NS-100	NS-100	NS-100	NS-100	G-100-4	C-WBI-400-1	G-100-1	G-1000-4	C-R-400-4
13	C-WBI-100-1	C-WBI-100-1	G-100-4	G-100-4	G-100-4	NS-100	R-400-3	C-R-400-2	G-400-4	R-1000-4
14	G-100-4	G-100-4	C-WBI-100-1	C-WBI-100-1	R-400-3	R-400-3	G-100-1	G-1000-4	NS-400	R-400-4
15	C-R-100-4	R-400-3	R-400-3	R-400-3	G-100-1	G-100-1	G-1000-4	G-400-4	C-R-400-2	C-R-400-2
16	C-R-100-3	C-R-100-4	G-100-1	G-100-1	C-WBI-100-1	G-1000-4	G-400-4	C-WBI-400-1	R-1000-4	NS-1000
17	R-400-3	G-100-1	G-1000-4	G-1000-4	G-1000-4	G-400-4	NS-100	R-1000-4	C-WBI-400-1	NS-400
18	C-R-100-2	C-R-100-3	G-400-4	G-400-4	G-400-4	C-WBI-100-1	R-1000-4	NS-100	R-400-4	C-WBI-400-1
19	G-100-1	G-1000-4	C-R-100-4	C-R-100-4	R-1000-4	R-1000-4	R-400-4	R-400-4	NS-100	R-400-2
20	G-1000-4	G-400-4	C-R-100-3	C-R-100-3	C-R-100-4	R-400-4	C-WBI-100-1	C-WBI-100-1	R-400-2	NS-100
21	G-400-4	C-R-100-2	C-R-100-2	R-1000-4	R-400-4	C-R-100-4	C-R-100-4	R-400-2	C-WBI-100-1	WBI-400-1
22	R-1000-4	R-1000-4	R-1000-4	R-400-4	C-R-100-3	C-R-100-3	R-400-2	C-R-100-4	WBI-400-1	C-WBI-100-1
23	R-400-4	R-400-4	R-400-4	C-R-100-2	C-R-100-2	R-400-2	C-R-100-3	C-R-100-3	C-R-100-4	C-R-100-4
24	R-400-2	R-400-2	R-400-2	R-400-2	R-400-2	C-R-100-2	C-R-100-2	WBI-400-1	C-R-100-3	Coastal
25	WBI-400-1	WBI-400-1	WBI-400-1	WBI-400-1	WBI-400-1	WBI-400-1	WBI-400-1	C-R-100-2	Coastal	C-R-100-3
26	Coastal	Coastal	Coastal	Coastal	Coastal	Coastal	Coastal	Coastal	C-R-100-2	R-100-4
27	R-100-4	R-100-4	R-100-4	R-100-4	R-100-4	R-100-4	R-100-4	R-100-4	R-100-4	WBI-100-1
28	WBI-100-1	WBI-100-1	WBI-100-1	WBI-100-1	WBI-100-1	WBI-100-1	WBI-100-1	WBI-100-1	WBI-100-1	R-100-3
29	R-100-3	R-100-3	R-100-3	R-100-3	R-100-3	R-100-3	R-100-3	R-100-3	R-100-3	C-R-100-2
30	R-100-2	R-100-2	R-100-2	R-100-2	R-100-2	R-100-2	R-100-2	R-100-2	R-100-2	R-100-2

Planning Unit 2

Residual Damages (Remaining Risk) - Based on Varying Levels of Nonstructural Participation

(Scenario 1 - Low Relative Sea Level Rise, High Employment, Dispersed Population; Low Uncertainty)

Plan #	Alternative	Equivalent Annual Residual Damages ($ Millions) Based on % Participation in Nonstructural Plans or Plan Components									
		100%	90%	80%	70%	60%	50%	40%	30%	20%	10%
2	Coastal	967	967	967	967	967	967	967	967	967	967
3	NS-100	649	681	713	745	776	808	840	871	903	935
4	NS-400	332	366	459	522	586	649	713	776	840	903
5	NS-1000	302	368	435	501	568	634	701	767	834	900
6	G-100-1	831	831	831	831	831	831	831	831	831	831
7	G-100-4	782	782	782	782	782	782	782	782	782	782
8	G-400-4	839	839	839	839	839	839	839	839	839	839
9	G-1000-4	839	839	839	839	839	839	839	839	839	839
10	R-100-2	1,017	1,017	1,017	1,017	1,017	1,017	1,017	1,017	1,017	1,017
11	R-100-3	993	993	993	993	993	993	993	993	993	993
12	R-100-4	980	980	980	980	980	980	980	980	980	980
13	R-400-2	916	916	916	916	916	916	916	916	916	916
14	R-400-3	821	821	821	821	821	821	821	821	821	821
15	R-400-4	879	879	879	879	879	879	879	879	879	879
16	R-1000-4	870	870	870	870	870	870	870	870	870	870
17	WBI-100-1	983	983	983	983	983	983	983	983	983	983
18	WBI-400-1	944	944	944	944	944	944	944	944	944	944
19	C-G-100-1	633	653	673	692	712	732	752	772	791	811
20	C-G-100-4	611	628	645	662	679	696	713	730	748	765
21	C-G-400-4	644	663	683	702	722	741	761	781	800	820
22	C-G-1000-4	630	651	672	693	714	735	755	776	797	818
23	C-R-100-2	821	840	860	880	899	919	939	958	978	998
24	C-R-100-3	814	831	849	867	885	903	921	939	957	975
25	C-R-100-4	810	827	844	861	878	895	912	929	946	963
26	C-R-400-2	642	670	697	725	752	779	807	834	861	889
27	C-R-400-3	573	598	622	647	672	697	722	746	771	796
28	C-R-400-4	645	669	692	715	739	762	786	809	832	856
29	C-R-1000-4	626	650	675	699	724	748	773	797	821	846
30	C-WBI-100-1	739	763	788	812	837	861	886	910	934	959
31	C-WBI-400-1	605	639	673	707	741	775	809	843	877	911

Planning Unit 3a

Residual Damages (Remaining Risk) Rankings - Based on Varying Levels of Nonstructural Participation

(Scenario 1 - Low Relative Sea Level Rise, High Employment, Dispersed Population; Low Uncertainty)

Rank	100%	90%	80%	70%	60%	50%	40%	30%	20%	10%
1	NS-1000	NS-1000	C-G-1000-2	C-M-100-1	C-M-100-1	C-M-100-1	C-M-100-1	C-M-100-1	C-M-100-1	C-M-100-1
2	NS-400	C-G-1000-2	C-M-100-1	C-G-1000-2	C-G-1000-2	C-G-1000-2	C-G-1000-2	M-100-1	M-100-1	M-100-1
3	C-G-1000-2	C-M-100-1	C-G-400-2	C-G-400-2	C-G-400-2	C-G-400-2	M-100-1	C-G-1000-2	C-G-1000-2	C-G-1000-2
4	C-M-100-1	NS-400	NS-1000	M-100-1	M-100-1	M-100-1	C-G-400-2	C-G-400-2	C-G-400-2	C-G-400-2
5	C-G-400-2	C-G-400-2	M-100-1	C-M-100-2	C-M-100-2	G-1000-2	G-1000-2	G-1000-2	G-1000-2	G-1000-2
6	M-100-1	M-100-1	C-M-100-2	G-1000-2	G-1000-2	C-M-100-2	G-400-2	G-400-2	G-400-2	G-400-2
7	C-M-100-2	C-M-100-2	NS-400	G-400-2	G-400-2	G-400-2	C-M-100-2	C-M-100-2	C-M-100-2	C-M-100-2
8	G-1000-2	G-1000-2	G-1000-2	M-100-2	M-100-2	M-100-2	M-100-2	M-100-2	M-100-2	M-100-2
9	NS-100	G-400-2	G-400-2	NS-1000	NS-1000	NS-1000	NS-1000	NS-1000	NS-1000	NS-1000
10	G-400-2	M-100-2	M-100-2	NS-400	NS-400	NS-400	NS-400	NS-400	NS-400	NS-400
11	M-100-2	NS-100	NS-100	NS-100	NS-100	NS-100	NS-100	NS-100	NS-100	NS-100
12	Coastal	Coastal	Coastal	Coastal	Coastal	Coastal	Coastal	Coastal	Coastal	Coastal

Planning Unit 3a

Residual Damages (Remaining Risk) - Based on Varying Levels of Nonstructural Participation

(Scenario 1 - Low Relative Sea Level Rise, High Employment, Dispersed Population; Low Uncertainty)

Plan #	Alternative	Equivalent Annual Residual Damages ($ Millions) Based on % Participation in Nonstructural Plans or Plan Components									
		100%	90%	80%	70%	60%	50%	40%	30%	20%	10%
2	Coastal	1,027	1,027	1,027	1,027	1,027	1,027	1,027	1,027	1,027	1,027
3	NS-100	512	563	616	666	718	769	821	872	924	975
4	NS-400	365	431	497	563	630	696	762	828	895	961
5	NS-1000	330	400	469	539	609	678	748	818	888	957
6	M-100-1	474	474	474	474	474	474	474	474	474	474
7	M-100-2	537	537	537	537	537	537	537	537	537	537
8	G-400-2	514	514	514	514	514	514	514	514	514	514
9	G-1000-2	506	506	506	506	506	506	506	506	506	506
10	C-M-100-1	426	431	435	440	445	450	455	460	464	469
11	C-M-100-2	483	488	494	499	504	510	515	521	526	531
12	C-G-400-2	434	442	450	458	466	474	482	490	498	506
13	C-G-1000-2	415	425	434	443	452	461	470	479	488	497

Planning Unit 3b

Residual Damages (Remaining Risk) Rankings - Based on Varying Levels of Nonstructural Participation

(Scenario 1 - Low Relative Sea Level Rise, High Employment, Dispersed Population; Low Uncertainty)

Rank	100%	90%	80%	70%	60%	50%	40%	30%	20%	10%
1	NS-1000	C-G-100-1	C-G-100-1	C-G-100-1	C-G-100-1	C-G-100-1	C-G-100-1	C-G-100-1	C-G-100-1	C-G-100-1
2	NS-400	NS-1000	G-100-1	G-100-1	G-100-1	G-100-1	G-100-1	G-100-1	G-100-1	G-100-1
3	C-G-100-1	G-100-1	C-F-400-1	C-F-400-1	C-F-400-1	C-F-400-1	C-F-400-1	C-F-400-1	C-F-400-1	C-F-400-1
4	C-F-400-1	NS-400	NS-1000	C-F-1000-1	C-F-1000-1	C-F-100-1	F-400-1	F-400-1	F-400-1	F-400-1
5	G-100-1	C-F-400-1	C-RL-400-1	C-F-100-1	C-F-100-1	C-F-1000-1	C-F-100-1	C-F-100-1	C-F-100-1	C-F-100-1
6	C-RL-400-1	C-RL-400-1	C-F-1000-1	C-RL-400-1	C-RL-400-1	F-400-1	C-F-1000-1	C-F-1000-1	C-F-1000-1	F-100-1
7	C-F-1000-1	C-F-1000-1	C-F-100-1	F-400-1	F-400-1	C-RL-400-1	F-100-1	F-100-1	F-100-1	C-F-1000-1
8	C-F-100-1	C-F-100-1	NS-400	NS-1000	F-100-1	F-100-1	C-RL-400-1	F-1000-1	F-1000-1	F-1000-1
9	C-RL-100-1	F-400-1	F-400-1	F-100-1	F-1000-1	F-1000-1	F-1000-1	C-RL-400-1	C-RL-400-1	C-RL-400-1
10	NS-100	C-RL-100-1	C-RL-100-1	C-RL-100-1	C-RL-100-1	C-RL-100-1	C-RL-100-1	C-RL-100-1	C-RL-100-1	C-RL-100-1
11	F-400-1	F-100-1	F-100-1	F-1000-1	NS-1000	RL-400-1	RL-400-1	RL-400-1	RL-400-1	RL-400-1
12	F-100-1	F-1000-1	F-1000-1	NS-400	NS-400	RL-100-1	RL-100-1	RL-100-1	RL-100-1	RL-100-1
13	F-1000-1	NS-100	NS-100	RL-400-1	RL-400-1	NS-1000	NS-1000	NS-1000	NS-1000	NS-1000
14	RL-400-1	RL-400-1	RL-400-1	RL-100-1	RL-100-1	NS-400	NS-400	NS-400	NS-400	NS-400
15	RL-100-1	RL-100-1	RL-100-1	NS-100	NS-100	NS-100	NS-100	NS-100	NS-100	NS-100
16	Coastal	Coastal	Coastal	Coastal	Coastal	Coastal	Coastal	Coastal	Coastal	Coastal

Planning Unit 3b

Residual Damages (Remaining Risk) - Based on Varying Levels of Nonstructural Participation

(Scenario 1 - Low Relative Sea Level Rise, High Employment, Dispersed Population; Low Uncertainty)

Plan #	Alternative	Equivalent Annual Residual Damages ($ Millions) Based on % Participation in Nonstructural Plans or Plan Components									
		100%	90%	80%	70%	60%	50%	40%	30%	20%	10%
2	Coastal	469	469	469	469	469	469	469	469	469	469
3	NS-100	245	267	290	312	335	357	380	402	425	447
4	NS-400	183	211	240	269	297	326	355	383	412	441
5	NS-1000	166	196	227	257	287	318	348	378	409	439
6	G-100-1	210	210	210	210	210	210	210	210	210	210
7	F-100-1	261	261	261	261	261	261	261	261	261	261
8	F-400-1	248	248	248	248	248	248	248	248	248	248
9	F-1000-1	267	267	267	267	267	267	267	267	267	267
10	RL-100-1	303	303	303	303	303	303	303	303	303	303
11	RL-400-1	299	299	299	299	299	299	299	299	299	299
12	C-G-100-1	191	193	195	197	199	201	203	205	207	208
13	C-F-100-1	229	232	236	239	242	245	248	251	255	258
14	C-F-400-1	209	213	216	220	224	228	232	236	240	244
15	C-F-1000-1	224	228	233	237	241	246	250	254	258	263
16	C-RL-100-1	244	250	256	262	268	274	280	286	292	298
17	C-RL-400-1	213	222	230	239	248	256	265	273	282	291

Planning Unit 4

Residual Damages (Remaining Risk) Rankings - Based on Varying Levels of Nonstructural Participation

(Scenario 1 - Low Relative Sea Level Rise, High Employment, Dispersed Population; Low Uncertainty)

Rank	100%	90%	80%	70%	60%	50%	40%	30%	20%	10%
1	C-G-1000-3	C-G-1000-3	C-G-1000-3	C-G-1000-3	C-G-1000-3	C-G-1000-3	C-G-1000-3	C-G-1000-3	C-G-100-1	C-G-100-1
2	NS-1000	NS-1000	C-RL-1000-1	C-RL-1000-1	C-G-100-1	C-G-100-1	C-G-100-1	C-G-100-1	C-G-1000-3	C-G-1000-3
3	C-RL-1000-1	C-RL-1000-1	NS-1000	C-G-400-3	C-G-400-3	C-G-400-3	C-G-400-3	C-G-400-3	C-G-400-3	G-100-1
4	NS-400	C-G-400-3	C-G-400-3	C-G-100-1	C-RL-1000-1	C-RL-1000-1	C-G-100-2	C-G-100-2	C-G-100-2	C-G-400-3
5	C-RL-400-1	NS-400	C-G-100-1	NS-1000	NS-1000	C-G-100-2	C-RL-1000-1	C-RL-1000-1	G-100-1	C-G-100-2
6	C-G-400-3	C-RL-400-1	C-RL-400-1	C-RL-400-1	C-RL-400-1	C-RL-400-1	C-RL-400-1	C-RL-400-1	C-RL-1000-1	G-1000-3
7	C-G-100-1	C-G-100-1	NS-400	NS-400	C-G-100-2	NS-1000	NS-1000	C-RL-100-1	C-RL-400-1	G-400-3
8	C-G-100-2	C-G-100-2	C-G-100-2	C-G-100-2	NS-400	NS-400	NS-400	G-100-1	G-1000-3	G-100-2
9	C-RL-100-1	C-RL-100-1	C-RL-100-1	C-RL-100-1	C-RL-100-1	C-RL-100-1	C-RL-100-1	NS-1000	C-RL-100-1	C-RL-1000-1
10	NS-100	NS-100	NS-100	NS-100	NS-100	NS-100	NS-100	NS-400	G-400-3	C-RL-400-1
11	G-100-1	G-100-1	G-100-1	G-100-1	G-100-1	G-100-1	G-100-1	G-1000-3	G-100-2	C-RL-100-1
12	G-1000-3	G-1000-3	G-1000-3	G-1000-3	G-1000-3	G-1000-3	G-1000-3	NS-100	NS-1000	RL-1000-1
13	G-400-3	G-400-3	G-400-3	G-400-3	G-400-3	G-400-3	G-400-3	G-400-3	NS-400	NS-1000
14	G-100-2	G-100-2	G-100-2	G-100-2	G-100-2	G-100-2	G-100-2	G-100-2	NS-100	RL-400-1
15	RL-1000-1	RL-1000-1	RL-1000-1	RL-1000-1	RL-1000-1	RL-1000-1	RL-1000-1	RL-1000-1	RL-1000-1	RL-100-1
16	RL-400-1	RL-400-1	RL-400-1	RL-400-1	RL-400-1	RL-400-1	RL-400-1	RL-400-1	RL-400-1	NS-400
17	RL-100-1	RL-100-1	RL-100-1	RL-100-1	RL-100-1	RL-100-1	RL-100-1	RL-100-1	RL-100-1	NS-100
18	Coastal	Coastal	Coastal	Coastal	Coastal	Coastal	Coastal	Coastal	Coastal	Coastal

Planning Unit 4

Residual Damages (Remaining Risk) - Based on Varying Levels of Nonstructural Participation

(Scenario 1 - Low Relative Sea Level Rise, High Employment, Dispersed Population; Low Uncertainty)

Plan #	Alternative	Equivalent Annual Residual Damages ($ Millions) Based on % Participation in Nonstructural Plans or Plan Components									
		100%	90%	80%	70%	60%	50%	40%	30%	20%	10%
2	Coastal	373	373	373	373	373	373	373	373	373	373
3	NS-100	206	223	239	256	273	289	306	323	339	356
4	NS-400	169	189	210	230	250	271	291	312	332	352
5	NS-1000	156	178	200	221	243	265	286	308	330	351
6	G-100-1	307	307	307	307	307	307	307	307	307	307
7	G-100-2	324	324	324	324	324	324	324	324	324	324
8	G-400-3	324	324	324	324	324	324	324	324	324	324
9	G-1000-3	319	319	319	319	319	319	319	319	319	319
10	RL-100-1	352	352	352	352	352	352	352	352	352	352
11	RL-400-1	352	352	352	352	352	352	352	352	352	352
12	RL-1000-1	349	349	349	349	349	349	349	349	349	349
13	C-G-100-1	182	195	207	220	232	245	257	270	282	295
14	C-G-100-2	194	207	220	233	246	259	272	285	298	311
15	C-G-400-3	174	189	204	219	234	249	264	279	294	309
16	C-G-1000-3	152	169	185	202	219	236	252	269	286	303
17	C-RL-100-1	201	216	231	246	261	277	292	307	322	337
18	C-RL-400-1	173	191	209	227	245	263	280	298	316	334
19	C-RL-1000-1	161	180	199	218	236	255	274	293	311	330

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Participation in Nonstructural Measures
All Planning Units

Remaining Structures at Risk with Various Levels of Participation

Planning Unit 1
Number of Structures Remaining at Risk in Nonstructural Alternatives
For 100-yr, 400-yr and 1,000-yr Frequency Events
Based on Varying Levels of Participation in Nonstructural Measures

Business-as-Usual, Compact Population

Nonstructural Alternative	Level of Participation	# Structures Included in Nonstructural Measures For Alternative	# Structures Remaining at Risk for Various Storm Frequency Events		
			100-year	400-year	1,000-year
NS-100 Buyouts 5,037 Raise-in-Place 16,735	100%	21,772	0	155,687	200,236
	90%	19,595	2,177	156,191	200,740
	80%	17,418	4,354	156,694	201,243
	70%	15,240	6,532	157,198	201,747
	60%	13,063	8,709	157,702	202,251
	50%	10,886	10,886	158,206	202,755
	40%	8,709	13,063	158,709	203,258
	30%	6,532	15,240	159,213	203,762
	20%	4,354	17,418	159,717	204,266
	10%	2,177	19,595	160,220	204,769
NS-400 Buyouts 8,453 Raise-in-Place 152,271	100%	160,724	0	0	196,820
	90%	144,652	2,177	16,072	197,665
	80%	128,579	4,354	32,145	198,511
	70%	112,507	6,532	48,217	199,356
	60%	96,434	8,709	64,290	200,201
	50%	80,362	10,886	80,362	201,047
	40%	64,290	13,063	96,434	201,892
	30%	48,217	15,240	112,507	202,737
	20%	32,145	17,418	128,579	203,582
	10%	16,072	19,595	144,652	204,428
NS-1000 Buyouts 23,776 Raise-in-Place 181,497	100%	205,273	0	0	0
	90%	184,746	2,177	16,072	20,527
	80%	164,218	4,354	32,145	41,055
	70%	143,691	6,532	48,217	61,582
	60%	123,164	8,709	64,290	82,109
	50%	102,637	10,886	80,362	102,637
	40%	82,109	13,063	96,434	123,164
	30%	61,582	15,240	112,507	143,691
	20%	41,055	17,418	128,579	164,218
	10%	20,527	19,595	144,652	184,746

Planning Unit 1
Number of Structures Remaining at Risk in Nonstructural Alternatives
For 100-yr, 400-yr and 1,000-yr Frequency Events
Based on Varying Levels of Participation in Nonstructural Measures

High Employment, Dispersed Population

Nonstructural Alternative	Level of Participation	# Structures Included in Nonstructural Measures For Alternative	# Structures Remaining at Risk for Various Storm Frequency Events		
			100-year	400-year	1,000-year
NS-100 Buyouts 10,472 Raise-in-Place 15,763	100%	26,235	0	208,909	275,915
	90%	23,612	2,624	209,956	276,962
	80%	20,988	5,247	211,003	278,009
	70%	18,365	7,871	212,051	279,057
	60%	15,741	10,494	213,098	280,104
	50%	13,118	13,118	214,145	281,151
	40%	10,494	15,741	215,192	282,198
	30%	7,871	18,365	216,239	283,245
	20%	5,247	20,988	217,287	284,293
	10%	2,624	23,612	218,334	285,340
NS-400 Buyouts 15,649 Raise-in-Place 203,732	100%	219,381	0	0	270,738
	90%	197,443	2,624	21,938	272,303
	80%	175,505	5,247	43,876	273,868
	70%	153,567	7,871	65,814	275,433
	60%	131,629	10,494	87,752	276,998
	50%	109,691	13,118	109,691	278,563
	40%	87,752	15,741	131,629	280,127
	30%	65,814	18,365	153,567	281,692
	20%	43,876	20,988	175,505	283,257
	10%	21,938	23,612	197,443	284,822
NS-1000 Buyouts 44,296 Raise-in-Place 242,091	100%	286,387	0	0	0
	90%	257,748	2,624	21,938	28,639
	80%	229,110	5,247	43,876	57,277
	70%	200,471	7,871	65,814	85,916
	60%	171,832	10,494	87,752	114,555
	50%	143,194	13,118	109,691	143,194
	40%	114,555	15,741	131,629	171,832
	30%	85,916	18,365	153,567	200,471
	20%	57,277	20,988	175,505	229,110
	10%	28,639	23,612	197,443	257,748

Planning Unit 2
Number of Structures Remaining at Risk in Nonstructural Alternatives
For 100-yr, 400-yr and 1,000-yr Frequency Events
Based on Varying Levels of Participation in Nonstructural Measures

Business-as-Usual, Compact Population

Nonstructural Alternative	Level of Participation	# Structures Included in Nonstructural Measures For Alternative	# Structures Remaining at Risk for Various Storm Frequency Events		
			100-year	400-year	1,000-year
NS-100 Buyouts 4,215 Raise-in-Place 12,356	100%	16,571	0	124,547	127,505
	90%	14,914	1,657	124,969	127,927
	80%	13,257	3,314	125,390	128,348
	70%	11,600	4,971	125,812	128,770
	60%	9,943	6,628	126,233	129,191
	50%	8,286	8,286	126,655	129,613
	40%	6,628	9,943	127,076	130,034
	30%	4,971	11,600	127,498	130,456
	20%	3,314	13,257	127,919	130,877
	10%	1,657	14,914	128,341	131,299
NS-400 Buyouts 16,621 Raise-in-Place 112,141	100%	128,762	0	0	115,099
	90%	115,886	1,657	12,876	116,761
	80%	103,010	3,314	25,752	118,423
	70%	90,133	4,971	38,629	120,085
	60%	77,257	6,628	51,505	121,747
	50%	64,381	8,286	64,381	123,410
	40%	51,505	9,943	77,257	125,072
	30%	38,629	11,600	90,133	126,734
	20%	25,752	13,257	103,010	128,396
	10%	12,876	14,914	115,886	130,058
NS-1000 Buyouts 22,975 Raise-in-Place 108,745	100%	131,720	0	0	0
	90%	118,548	1,657	12,876	13,172
	80%	105,376	3,314	25,752	26,344
	70%	92,204	4,971	38,629	39,516
	60%	79,032	6,628	51,505	52,688
	50%	65,860	8,286	64,381	65,860
	40%	52,688	9,943	77,257	79,032
	30%	39,516	11,600	90,133	92,204
	20%	26,344	13,257	103,010	105,376
	10%	13,172	14,914	115,886	118,548

Planning Unit 2
Number of Structures Remaining at Risk in Nonstructural Alternatives
For 100-yr, 400-yr and 1,000-yr Frequency Events
Based on Varying Levels of Participation in Nonstructural Measures

High Employment, Dispersed Population

Nonstructural Alternative	Level of Participation	# Structures Included in Nonstructural Measures For Alternative	# Structures Remaining at Risk for Various Storm Frequency Events		
			100-year	400-year	1,000-year
NS-100 Buyouts 5,777 Raise-in-Place 11,756	100%	17,533	0	162,347	166,218
	90%	15,780	1,753	162,925	166,796
	80%	14,026	3,507	163,502	167,373
	70%	12,273	5,260	164,080	167,951
	60%	10,520	7,013	164,658	168,529
	50%	8,767	8,767	165,236	169,107
	40%	7,013	10,520	165,813	169,684
	30%	5,260	12,273	166,391	170,262
	20%	3,507	14,026	166,969	170,840
	10%	1,753	15,780	167,546	171,417
NS-400 Buyouts 23,085 Raise-in-Place 145,039	100%	168,124	0	0	148,910
	90%	151,312	1,753	16,812	151,219
	80%	134,499	3,507	33,625	153,527
	70%	117,687	5,260	50,437	155,836
	60%	100,874	7,013	67,250	158,144
	50%	84,062	8,767	84,062	160,453
	40%	67,250	10,520	100,874	162,761
	30%	50,437	12,273	117,687	165,070
	20%	33,625	14,026	134,499	167,378
	10%	16,812	15,780	151,312	169,687
NS-1000 Buyouts 34,357 Raise-in-Place 137,638	100%	171,995	0	0	0
	90%	154,796	1,753	16,812	17,200
	80%	137,596	3,507	33,625	34,399
	70%	120,397	5,260	50,437	51,599
	60%	103,197	7,013	67,250	68,798
	50%	85,998	8,767	84,062	85,998
	40%	68,798	10,520	100,874	103,197
	30%	51,599	12,273	117,687	120,397
	20%	34,399	14,026	134,499	137,596
	10%	17,200	15,780	151,312	154,796

Planning Unit 3a

Number of Structures Remaining at Risk in Nonstructural Alternatives

For 100-yr, 400-yr and 1,000-yr Frequency Events

Based on Varying Levels of Participation in Nonstructural Measures

Business-as-Usual, Compact Population

Nonstructural Alternative	Level of Participation	# Structures Included in Nonstructural Measures For Alternative	# Structures Remaining at Risk for Various Storm Frequency Events		
			100-year	400-year	1,000-year
NS-100 Buyouts 614 Raise-in-Place 30,617	100%	31,231	0	52,613	58,870
	90%	28,108	3,123	52,674	58,931
	80%	24,985	6,246	52,736	58,993
	70%	21,862	9,369	52,797	59,054
	60%	18,739	12,492	52,859	59,116
	50%	15,616	15,616	52,920	59,177
	40%	12,492	18,739	52,981	59,238
	30%	9,369	21,862	53,043	59,300
	20%	6,246	24,985	53,104	59,361
	10%	3,123	28,108	53,166	59,423
NS-400 Buyouts 6,184 Raise-in-Place 47,043	100%	53,227	0	0	53,300
	90%	47,904	3,123	5,323	53,918
	80%	42,582	6,246	10,645	54,537
	70%	37,259	9,369	15,968	55,155
	60%	31,936	12,492	21,291	55,774
	50%	26,614	15,616	26,614	56,392
	40%	21,291	18,739	31,936	57,010
	30%	15,968	21,862	37,259	57,629
	20%	10,645	24,985	42,582	58,247
	10%	5,323	28,108	47,904	58,866
NS-1000 Buyouts 9,748 Raise-in-Place 49,736	100%	59,484	0	0	0
	90%	53,536	3,123	5,323	5,948
	80%	47,587	6,246	10,645	11,897
	70%	41,639	9,369	15,968	17,845
	60%	35,690	12,492	21,291	23,794
	50%	29,742	15,616	26,614	29,742
	40%	23,794	18,739	31,936	35,690
	30%	17,845	21,862	37,259	41,639
	20%	11,897	24,985	42,582	47,587
	10%	5,948	28,108	47,904	53,536

Planning Unit 3a

Number of Structures Remaining at Risk in Nonstructural Alternatives

For 100-yr, 400-yr and 1,000-yr Frequency Events

Based on Varying Levels of Participation in Nonstructural Measures

High Employment, Dispersed Population

Nonstructural Alternative	Level of Participation	# Structures Included in Nonstructural Measures For Alternative	# Structures Remaining at Risk for Various Storm Frequency Events		
			100-year	400-year	1,000-year
NS-100 Buyouts 734 Raise-in-Place 30,643	100%	31,377	0	62,765	68,845
	90%	28,239	3,138	62,838	68,918
	80%	25,102	6,275	62,912	68,992
	70%	21,964	9,413	62,985	69,065
	60%	18,826	12,551	63,059	69,139
	50%	15,689	15,689	63,132	69,212
	40%	12,551	18,826	63,205	69,285
	30%	9,413	21,964	63,279	69,359
	20%	6,275	25,102	63,352	69,432
	10%	3,138	28,239	63,426	69,506
NS-400 Buyouts 7,695 Raise-in-Place 55,804	100%	63,499	0	0	61,884
	90%	57,149	3,138	6,350	62,654
	80%	50,799	6,275	12,700	63,423
	70%	44,449	9,413	19,050	64,193
	60%	38,099	12,551	25,400	64,962
	50%	31,750	15,689	31,750	65,732
	40%	25,400	18,826	38,099	66,501
	30%	19,050	21,964	44,449	67,271
	20%	12,700	25,102	50,799	68,040
	10%	6,350	28,239	57,149	68,810
NS-1000 Buyouts 12,747 Raise-in-Place 56,832	100%	69,579	0	0	0
	90%	62,621	3,138	6,350	6,958
	80%	55,663	6,275	12,700	13,916
	70%	48,705	9,413	19,050	20,874
	60%	41,747	12,551	25,400	27,832
	50%	34,790	15,689	31,750	34,790
	40%	27,832	18,826	38,099	41,747
	30%	20,874	21,964	44,449	48,705
	20%	13,916	25,102	50,799	55,663
	10%	6,958	28,239	57,149	62,621

Planning Unit 3b

Number of Structures Remaining at Risk in Nonstructural Alternatives

For 100-yr, 400-yr and 1,000-yr Frequency Events

Based on Varying Levels of Participation in Nonstructural Measures

Business-as-Usual, Compact Population

Nonstructural Alternative	Level of Participation	# Structures Included in Nonstructural Measures For Alternative	# Structures Remaining at Risk for Various Storm Frequency Events		
			100-year	400-year	1,000-year
NS-100 Buyouts 903 Raise-in-Place 10,248	100%	11,151	0	21,455	29,932
	90%	10,036	1,115	21,545	30,022
	80%	8,921	2,230	21,636	30,113
	70%	7,806	3,345	21,726	30,203
	60%	6,691	4,460	21,816	30,293
	50%	5,576	5,576	21,907	30,384
	40%	4,460	6,691	21,997	30,474
	30%	3,345	7,806	22,087	30,564
	20%	2,230	8,921	22,177	30,654
	10%	1,115	10,036	22,268	30,745
NS-400 Buyouts 957 Raise-in-Place 21,401	100%	22,358	0	0	29,879
	90%	20,122	1,115	2,236	29,975
	80%	17,886	2,230	4,472	30,070
	70%	15,651	3,345	6,707	30,166
	60%	13,415	4,460	8,943	30,262
	50%	11,179	5,576	11,179	30,358
	40%	8,943	6,691	13,415	30,453
	30%	6,707	7,806	15,651	30,549
	20%	4,472	8,921	17,886	30,645
	10%	2,236	10,036	20,122	30,740
NS-1000 Buyouts 1,307 Raise-in-Place 29,528	100%	30,835	0	0	0
	90%	27,752	1,115	2,236	3,084
	80%	24,668	2,230	4,472	6,167
	70%	21,585	3,345	6,707	9,251
	60%	18,501	4,460	8,943	12,334
	50%	15,418	5,576	11,179	15,418
	40%	12,334	6,691	13,415	18,501
	30%	9,251	7,806	15,651	21,585
	20%	6,167	8,921	17,886	24,668
	10%	3,084	10,036	20,122	27,752

Planning Unit 3b

Number of Structures Remaining at Risk in Nonstructural Alternatives

For 100-yr, 400-yr and 1,000-yr Frequency Events

Based on Varying Levels of Participation in Nonstructural Measures

High Employment, Dispersed Population

Nonstructural Alternative	Level of Participation	# Structures Included in Nonstructural Measures For Alternative	# Structures Remaining at Risk for Various Storm Frequency Events		
			100-year	400-year	1,000-year
NS-100 Buyouts 846 Raise-in-Place 10,003	100%	10,849	0	23,532	32,124
	90%	9,764	1,085	23,617	32,209
	80%	8,679	2,170	23,701	32,293
	70%	7,594	3,255	23,786	32,378
	60%	6,509	4,340	23,870	32,462
	50%	5,425	5,425	23,955	32,547
	40%	4,340	6,509	24,040	32,632
	30%	3,255	7,594	24,124	32,716
	20%	2,170	8,679	24,209	32,801
	10%	1,085	9,764	24,293	32,885
NS-400 Buyouts 907 Raise-in-Place 23,471	100%	24,378	0	0	32,063
	90%	21,940	1,085	2,438	32,154
	80%	19,502	2,170	4,876	32,244
	70%	17,065	3,255	7,313	32,335
	60%	14,627	4,340	9,751	32,426
	50%	12,189	5,425	12,189	32,517
	40%	9,751	6,509	14,627	32,607
	30%	7,313	7,594	17,065	32,698
	20%	4,876	8,679	19,502	32,789
	10%	2,438	9,764	21,940	32,879
NS-1000 Buyouts 1,307 Raise-in-Place 31,663	100%	32,970	0	0	0
	90%	29,673	1,085	2,438	3,297
	80%	26,376	2,170	4,876	6,594
	70%	23,079	3,255	7,313	9,891
	60%	19,782	4,340	9,751	13,188
	50%	16,485	5,425	12,189	16,485
	40%	13,188	6,509	14,627	19,782
	30%	9,891	7,594	17,065	23,079
	20%	6,594	8,679	19,502	26,376
	10%	3,297	9,764	21,940	29,673

Planning Unit 4

Number of Structures Remaining at Risk in Nonstructural Alternatives

For 100-yr, 400-yr and 1,000-yr Frequency Events

Based on Varying Levels of Participation in Nonstructural Measures

Business-as-Usual, Compact Population

Nonstructural Alternative	Level of Participation	# Structures Included in Nonstructural Measures For Alternative	# Structures Remaining at Risk for Various Storm Frequency Events		
			100-year	400-year	1,000-year
NS-100 Buyouts 2,250 Raise-in-Place 6,138	100%	8,388	0	14,707	23,091
	90%	7,549	839	14,932	23,316
	80%	6,710	1,678	15,157	23,541
	70%	5,872	2,516	15,382	23,766
	60%	5,033	3,355	15,607	23,991
	50%	4,194	4,194	15,832	24,216
	40%	3,355	5,033	16,057	24,441
	30%	2,516	5,872	16,282	24,666
	20%	1,678	6,710	16,507	24,891
	10%	839	7,549	16,732	25,116
NS-400 Buyouts 2,509 Raise-in-Place 14,448	100%	16,957	0	0	22,832
	90%	15,261	839	1,696	23,083
	80%	13,566	1,678	3,391	23,334
	70%	11,870	2,516	5,087	23,585
	60%	10,174	3,355	6,783	23,836
	50%	8,479	4,194	8,479	24,087
	40%	6,783	5,033	10,174	24,337
	30%	5,087	5,872	11,870	24,588
	20%	3,391	6,710	13,566	24,839
	10%	1,696	7,549	15,261	25,090
NS-1000 Buyouts 3,150 Raise-in-Place 22,191	100%	25,341	0	0	0
	90%	22,807	839	1,696	2,534
	80%	20,273	1,678	3,391	5,068
	70%	17,739	2,516	5,087	7,602
	60%	15,205	3,355	6,783	10,136
	50%	12,671	4,194	8,479	12,671
	40%	10,136	5,033	10,174	15,205
	30%	7,602	5,872	11,870	17,739
	20%	5,068	6,710	13,566	20,273
	10%	2,534	7,549	15,261	22,807

Planning Unit 4

Number of Structures Remaining at Risk In Nonstructural Alternatives

For 100-yr, 400-yr and 1,000-yr Frequency Events

Based on Varying Levels of Participation in Nonstructural Measures

High Employment, Dispersed Population

Nonstructural Alternative	Level of Participation	# Structures Included in Nonstructural Measures For Alternative	# Structures Remaining at Risk for Various Storm Frequency Events		
			100-year	400-year	1,000-year
NS-100 Buyouts 2,248 Raise-in-Place 6,160	100%	8,408	0	17,140	27,658
	90%	7,567	841	17,365	27,883
	80%	6,726	1,682	17,590	28,108
	70%	5,886	2,522	17,814	28,332
	60%	5,045	3,363	18,039	28,557
	50%	4,204	4,204	18,264	28,782
	40%	3,363	5,045	18,489	29,007
	30%	2,522	5,886	18,714	29,232
	20%	1,682	6,726	18,938	29,456
	10%	841	7,567	19,163	29,681
NS-400 Buyouts 2,547 Raise-in-Place 16,841	100%	19,388	0	0	27,359
	90%	17,449	841	1,939	27,614
	80%	15,510	1,682	3,878	27,868
	70%	13,572	2,522	5,816	28,123
	60%	11,633	3,363	7,755	28,378
	50%	9,694	4,204	9,694	28,633
	40%	7,755	5,045	11,633	28,887
	30%	5,816	5,886	13,572	29,142
	20%	3,878	6,726	15,510	29,397
	10%	1,939	7,567	17,449	29,651
NS-1000 Buyouts 3,146 Raise-in-Place 26,760	100%	29,906	0	0	0
	90%	26,915	841	1,939	2,991
	80%	23,925	1,682	3,878	5,981
	70%	20,934	2,522	5,816	8,972
	60%	17,944	3,363	7,755	11,962
	50%	14,953	4,204	9,694	14,953
	40%	11,962	5,045	11,633	17,944
	30%	8,972	5,886	13,572	20,934
	20%	5,981	6,726	15,510	23,925
	10%	2,991	7,567	17,449	26,915

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Evaluation of Alternatives
Future Degraded Coast Conditions
All Planning Units

Sample Plan Rankings and Evaluation Criteria Tables

Planning Unit 1

Comparison of Total System Costs

Alternatives w/ Sustaining Coastal Landscape vs. w/ Future Degraded Coastal Landscape
(Scenario 1 - LRSLR, High Employment, Dispersed Population; Low Uncertainty)

With Future Degraded Coastal Landscape Analysis						
Plan #	Alternative	Equivalent Annual Life-Cycle Costs ($Millions)	With Project Residual Damages ($ Millions)	Total System Costs ($ Millions)	Rank	Total System Costs Sustaining Coastal Landscape ($ Millions)
3	NS-0100	329	755	1,084	1	1,606
10	LP-1a-0100-1	363	910	1,272	2	1,807
21	C-LP-1a-0100-1	560	751	1,311	3	1,845
4	NS-0400	1,216	468	1,684	4	2,224
7	HL-1a-0100-3	813	985	1,798	5	2,317
18	C-HL-1a-0100-3	971	888	1,859	6	2,384
12	LP-1a-0100-3	1,080	856	1,936	7	2,472
6	HL-1a-0100-2	982	964	1,946	8	2,475
23	C-LP-1a-0100-3	1,231	755	1,986	9	2,523
11	LP-1a-0100-2	1,160	844	2,004	10	2,533
17	C-HL-1a-0100-2	1,129	882	2,011	11	2,545
22	C-LP-1a-0100-2	1,303	752	2,056	12	2,586
13	LP-1b-0400-1	1,300	883	2,183	13	2,727
24	C-LP-1b-0400-1	1,599	688	2,286	14	2,832
5	NS-1000	1,991	388	2,378	15	2,919
15	LP-1b-1000-1	1,714	879	2,592	16	3,121
26	C-LP-1b-1000-1	2,045	670	2,715	17	3,246
14	LP-1b-0400-3	2,311	817	3,127	18	3,658
9	HL-1b-0400-3	2,334	829	3,163	19	3,647
25	C-LP-1b-0400-3	2,472	709	3,181	20	3,713
20	C-HL-1b-0400-3	2,508	710	3,218	21	3,715
8	HL-1b-0400-2	2,573	808	3,381	22	3,873
19	C-HL-1b-0400-2	2,735	711	3,445	23	3,946
16	LP-1b-1000-2	3,059	797	3,857	24	4,373
27	C-LP-1b-1000-2	3,236	698	3,934	25	4,451

Planning Unit 1

Total System Costs Rankings

(Alternatives With Future Degraded Coastal Landscape)

Rank	Scenario 1 Low RSLR High Employment Dispersed Population	Scenario 2 High RSLR High Employment Dispersed Population	Scenario 3 Low RSLR Business-as-Usual Compact Population	Scenario 4 High RSLR Business-as-Usual Compact Population
1	NS-0100	NS-0100	NS-0100	NS-0100
2	LP-1a-0100-1	LP-1a-0100-1	LP-1a-0100-1	LP-1a-0100-1
3	C-LP-1a-0100-1	C-LP-1a-0100-1	C-LP-1a-0100-1	C-LP-1a-0100-1
4	NS-0400	NS-0400	HL-1a-0100-3	HL-1a-0100-3
5	HL-1a-0100-3	HL-1a-0100-3	C-HL-1a-0100-3	C-HL-1a-0100-3
6	C-HL-1a-0100-3	C-HL-1a-0100-3	NS-0400	NS-0400
7	LP-1a-0100-3	LP-1a-0100-3	LP-1a-0100-3	HL-1a-0100-2
8	HL-1a-0100-2	HL-1a-0100-2	HL-1a-0100-2	LP-1a-0100-3
9	C-LP-1a-0100-3	C-LP-1a-0100-3	C-LP-1a-0100-3	C-HL-1a-0100-2
10	LP-1a-0100-2	C-HL-1a-0100-2	C-HL-1a-0100-2	C-LP-1a-0100-3
11	C-HL-1a-0100-2	LP-1a-0100-2	LP-1a-0100-2	LP-1a-0100-2
12	C-LP-1a-0100-2	C-LP-1a-0100-2	C-LP-1a-0100-2	C-LP-1a-0100-2
13	LP-1b-0400-1	NS-1000	LP-1b-0400-1	LP-1b-0400-1
14	C-LP-1b-0400-1	LP-1b-0400-1	C-LP-1b-0400-1	C-LP-1b-0400-1
15	NS-1000	C-LP-1b-0400-1	NS-1000	NS-1000
16	LP-1b-1000-1	LP-1b-1000-1	LP-1b-1000-1	LP-1b-1000-1
17	C-LP-1b-1000-1	C-LP-1b-1000-1	C-LP-1b-1000-1	C-LP-1b-1000-1
18	LP-1b-0400-3	LP-1b-0400-3	LP-1b-0400-3	LP-1b-0400-3
19	HL-1b-0400-3	C-LP-1b-0400-3	C-LP-1b-0400-3	C-LP-1b-0400-3
20	C-LP-1b-0400-3	HL-1b-0400-3	HL-1b-0400-3	HL-1b-0400-3
21	C-HL-1b-0400-3	C-HL-1b-0400-3	C-HL-1b-0400-3	C-HL-1b-0400-3
22	HL-1b-0400-2	HL-1b-0400-2	HL-1b-0400-2	HL-1b-0400-2
23	C-HL-1b-0400-2	C-HL-1b-0400-2	C-HL-1b-0400-2	C-HL-1b-0400-2
24	LP-1b-1000-2	LP-1b-1000-2	LP-1b-1000-2	LP-1b-1000-2
25	C-LP-1b-1000-2	C-LP-1b-1000-2	C-LP-1b-1000-2	C-LP-1b-1000-2

Planning Unit 2

Comparison of Total System Costs

Alternatives w/ Sustaining Coastal Landscape vs. w/ Future Degraded Coastal Landscape
(Scenario 1 - LRSLR, High Employment, Dispersed Population; Low Uncertainty)

With Future Degraded Coastal Landscape Analysis						Total System Costs Sustaining Coastal Landscape ($ Millions)
Plan #	Alternative	Equivalent Annual Life-Cycle Costs ($Millions)	With Project Residual Damages ($ Millions)	Total System Costs ($ Millions)	Rank	
3	NS-100	217	678	896	1	1,666
30	C-WBI-100-1	270	782	1,052	2	1,804
17	WBI-100-1	55	1,022	1,076	3	1,834
4	NS-400	803	360	1,163	4	1,935
19	C-G-100-1	555	671	1,226	5	1,976
6	G-100-1	400	867	1,267	6	2,019
23	C-R-100-2	570	846	1,416	7	2,187
10	R-100-2	399	1,040	1,439	8	2,211
24	C-R-100-3	675	838	1,513	9	2,285
20	C-G-100-4	886	631	1,517	10	2,282
11	R-100-3	521	1,015	1,537	11	2,311
7	G-100-4	756	800	1,556	12	2,323
25	C-R-100-4	833	832	1,665	13	2,436
12	R-100-4	688	1,000	1,688	14	2,461
31	C-WBI-400-1	1,116	637	1,753	15	2,517
5	NS-1000	1,494	314	1,808	16	2,596
18	WBI-400-1	938	973	1,911	17	2,678
26	C-R-400-2	1,441	665	2,107	18	2,875
27	C-R-400-3	1,584	597	2,182	19	2,946
13	R-400-2	1,306	938	2,243	20	3,013
14	R-400-3	1,457	843	2,300	21	3,066
28	C-R-400-4	1,737	667	2,404	22	3,169
15	R-400-4	1,620	898	2,517	23	3,285
21	C-G-400-4	1,898	664	2,562	24	3,335
8	G-400-4	1,781	856	2,637	25	3,413
29	C-R-1000-4	2,181	638	2,819	26	3,569
16	R-1000-4	2,038	889	2,927	27	3,670
22	C-G-1000-4	2,322	640	2,962	28	3,744
9	G-1000-4	2,170	856	3,026	29	3,800

Planning Unit 2

Total System Costs Rankings

(Alternatives With Future Degraded Coastal Landscape)

Rank	Scenario 1 Low RSLR High Employment Dispersed Population	Scenario 2 High RSLR High Employment Dispersed Population	Scenario 3 Low RSLR Business-as-Usual Compact Population	Scenario 4 High RSLR Business-as-Usual Compact Population
1	NS-100	NS-100	NS-100	NS-100
2	C-WBI-100-1	C-WBI-100-1	C-WBI-100-1	C-WBI-100-1
3	WBI-100-1	WBI-100-1	WBI-100-1	WBI-100-1
4	NS-400	NS-400	C-G-100-1	C-G-100-1
5	C-G-100-1	C-G-100-1	G-100-1	G-100-1
6	G-100-1	G-100-1	C-R-100-2	C-R-100-2
7	C-R-100-2	C-R-100-2	R-100-2	R-100-2
8	R-100-2	R-100-2	C-R-100-3	C-R-100-3
9	C-R-100-3	C-G-100-4	C-G-100-4	C-G-100-4
10	C-G-100-4	C-R-100-3	R-100-3	R-100-3
11	R-100-3	R-100-3	G-100-4	G-100-4
12	G-100-4	G-100-4	C-R-100-4	C-R-100-4
13	C-R-100-4	C-R-100-4	R-100-4	R-100-4
14	R-100-4	R-100-4	NS-400	NS-400
15	C-WBI-400-1	C-WBI-400-1	C-WBI-400-1	C-WBI-400-1
16	NS-1000	NS-1000	WBI-400-1	NS-1000
17	WBI-400-1	WBI-400-1	NS-1000	WBI-400-1
18	C-R-400-2	C-R-400-2	C-R-400-2	C-R-400-2
19	C-R-400-3	C-R-400-3	R-400-2	R-400-2
20	R-400-2	R-400-2	C-R-400-3	C-R-400-3
21	R-400-3	R-400-3	R-400-3	R-400-3
22	C-R-400-4	C-R-400-4	C-R-400-4	C-R-400-4
23	R-400-4	R-400-4	R-400-4	R-400-4
24	C-G-400-4	C-G-400-4	C-G-400-4	C-G-400-4
25	G-400-4	G-400-4	G-400-4	G-400-4
26	C-R-1000-4	C-R-1000-4	C-R-1000-4	C-R-1000-4
27	R-1000-4	R-1000-4	R-1000-4	R-1000-4
28	C-G-1000-4	C-G-1000-4	C-G-1000-4	C-G-1000-4
29	G-1000-4	G-1000-4	G-1000-4	G-1000-4

Planning Unit 3a

Comparison of Total System Costs

Alternatives w/ Sustaining Coastal Landscape vs. w/ Future Degraded Coastal Landscape

(Scenario 1 - LRSLR, High Employment, Dispersed Population; Low Uncertainty)

With Future Degraded Coastal Landscape Analysis						Total System Costs Sustaining Coastal Landscape ($ Millions)
Plan #	Alternative	Equivalent Annual Life-Cycle Costs ($Millions)	With Project Residual Damages ($ Millions)	Total System Costs ($ Millions)	Rank	
4	NS-400	544	365	909	1	2,098
3	NS-100	399	512	911	2	2,099
5	NS-1000	597	330	927	3	2,116
11	C-M-100-2	1,005	484	1,489	4	2,676
7	M-100-2	969	538	1,507	5	2,695
10	C-M-100-1	1,126	427	1,552	6	2,740
6	M-100-1	1,093	475	1,568	7	2,756
12	C-G-400-2	1,365	434	1,799	8	2,987
8	G-400-2	1,287	515	1,802	9	2,990
9	G-1000-2	1,411	507	1,918	10	3,105
13	C-G-1000-2	1,538	416	1,954	11	3,142

Planning Unit 3a

Total System Costs Rankings

(Alternatives With Future Degraded Coastal Landscape)

Rank	Scenario 1 Low RSLR High Employment Dispersed Population	Scenario 2 High RSLR High Employment Dispersed Population	Scenario 3 Low RSLR Business-as-Usual Compact Population	Scenario 4 High RSLR Business-as-Usual Compact Population
1	NS-400	NS-1000	NS-100	NS-400
2	NS-100	NS-400	NS-400	NS-1000
3	NS-1000	NS-100	NS-1000	NS-100
4	C-M-100-2	C-M-100-2	C-M-100-2	C-M-100-2
5	M-100-2	M-100-2	M-100-2	M-100-2
6	C-M-100-1	C-M-100-1	C-M-100-1	C-M-100-1
7	M-100-1	M-100-1	M-100-1	M-100-1
8	C-G-400-2	C-G-400-2	G-400-2	G-400-2
9	G-400-2	G-400-2	C-G-400-2	C-G-400-2
10	G-1000-2	G-1000-2	G-1000-2	G-1000-2
11	C-G-1000-2	C-G-1000-2	C-G-1000-2	C-G-1000-2

Planning Unit 3b

Comparison of Total System Costs

Alternatives w/ Sustaining Coastal Landscape vs. w/ Future Degraded Coastal Landscape

(Scenario 1 - LRSLR, High Employment, Dispersed Population; Low Uncertainty)

With Future Degraded Coastal Landscape Analysis						Total System Costs Sustaining Coastal Landscape ($ Millions)
Plan #	Alternative	Equivalent Annual Life-Cycle Costs ($Millions)	With Project Residual Damages ($ Millions)	Total System Costs ($ Millions)	Rank	
3	NS-100	134	245	379	1	622
4	NS-400	232	183	415	2	658
5	NS-1000	290	166	457	3	699
16	C-RL-100-1	635	244	880	4	1,122
10	RL-100-1	591	304	895	5	1,138
13	C-F-100-1	729	229	959	6	1,201
7	F-100-1	711	261	972	7	1,215
12	C-G-100-1	789	191	981	8	1,224
6	G-100-1	777	210	987	9	1,230
17	C-RL-400-1	970	213	1,183	10	1,426
11	RL-400-1	919	299	1,218	11	1,461
14	C-F-400-1	1,212	209	1,421	12	1,664
8	F-400-1	1,197	248	1,445	13	1,688
15	C-F-1000-1	1,610	224	1,834	14	2,077
9	F-1000-1	1,587	267	1,854	15	2,096

Planning Unit 3b

Total System Costs Rankings

(Alternatives With Future Degraded Coastal Landscape)

Rank	Scenario 1	Scenario 2	Scenario 3	Scenario 4
	Low RSLR High Employment Dispersed Population	High RSLR High Employment Dispersed Population	Low RSLR Business-as-Usual Compact Population	High RSLR Business-as-Usual Compact Population
1	NS-100	NS-100	NS-100	NS-100
2	NS-400	NS-400	NS-400	NS-400
3	NS-1000	NS-1000	NS-1000	NS-1000
4	C-RL-100-1	C-RL-100-1	C-RL-100-1	C-RL-100-1
5	RL-100-1	RL-100-1	RL-100-1	RL-100-1
6	C-F-100-1	C-F-100-1	C-F-100-1	C-F-100-1
7	F-100-1	F-100-1	F-100-1	F-100-1
8	C-G-100-1	C-G-100-1	C-G-100-1	C-G-100-1
9	G-100-1	G-100-1	G-100-1	G-100-1
10	C-RL-400-1	C-RL-400-1	RL-400-1	RL-400-1
11	RL-400-1	RL-400-1	C-RL-400-1	C-RL-400-1
12	C-F-400-1	C-F-400-1	C-F-400-1	C-F-400-1
13	F-400-1	F-400-1	F-400-1	F-400-1
14	C-F-1000-1	C-F-1000-1	C-F-1000-1	C-F-1000-1
15	F-1000-1	F-1000-1	F-1000-1	F-1000-1

Planning Unit 4

Comparison of Total System Costs

Alternatives w/ Sustaining Coastal Landscape vs. w/ Future Degraded Coastal Landscape

(Scenario 1 - LRSLR, High Employment, Dispersed Population; Low Uncertainty)

With Future Degraded Coastal Landscape Analysis						Total System Costs Sustaining Coastal Landscape ($ Millions)
Plan #	Alternative	Equivalent Annual Life-Cycle Costs ($Millions)	With Project Residual Damages ($ Millions)	Total System Costs ($ Millions)	Rank	
3	NS-100	109	206	316	1	866
4	NS-400	176	169	345	2	895
5	NS-1000	245	156	401	3	952
18	C-RL-400-1	262	174	436	4	986
17	C-RL-100-1	235	201	436	4	987
10	RL-100-1	138	352	490	6	1,041
11	RL-400-1	177	352	529	7	1,079
19	C-RL-1000-1	371	161	532	8	1,082
12	RL-1000-1	192	349	541	9	1,091
15	C-G-400-3	675	174	849	10	1,399
13	C-G-100-1	686	182	869	11	1,419
14	C-G-100-2	676	194	870	12	1,420
6	G-100-1	612	308	920	13	1,470
8	G-400-3	599	324	923	14	1,474
7	G-100-2	602	324	926	15	1,476
9	G-1000-3	623	320	943	16	1,493
16	C-G-1000-3	806	152	958	17	1,509

Planning Unit 4
Total System Costs Rankings
(Alternatives With Future Degraded Coastal Landscape)

Rank	Scenario 1 Low RSLR High Employment Dispersed Population	Scenario 2 High RSLR High Employment Dispersed Population	Scenario 3 Low RSLR Business-as-Usual Compact Population	Scenario 4 High RSLR Business-as-Usual Compact Population
1	NS-100	NS-100	NS-100	NS-100
2	NS-400	NS-400	NS-400	NS-400
3	NS-1000	NS-1000	NS-1000	NS-1000
4	C-RL-400-1	C-RL-400-1	C-RL-100-1	C-RL-100-1
5	C-RL-100-1	C-RL-100-1	C-RL-400-1	C-RL-400-1
6	RL-100-1	RL-100-1	RL-100-1	RL-100-1
7	RL-400-1	C-RL-1000-1	C-RL-1000-1	C-RL-1000-1
8	C-RL-1000-1	RL-400-1	RL-400-1	RL-400-1
9	RL-1000-1	RL-1000-1	RL-1000-1	RL-1000-1
10	C-G-400-3	C-G-400-3	C-G-100-1	C-G-400-3
11	C-G-100-1	C-G-100-1	C-G-100-2	C-G-100-1
12	C-G-100-2	C-G-100-2	C-G-400-3	C-G-100-2
13	G-100-1	G-100-1	G-400-3	C-G-1000-3
14	G-400-3	G-400-3	G-100-1	G-100-1
15	G-100-2	G-100-2	G-100-2	G-400-3
16	G-1000-3	G-1000-3	C-G-1000-3	G-100-2
17	C-G-1000-3	C-G-1000-3	G-1000-3	G-1000-3

FOR CONTINUATION OF HOUSE DOCUMENT 111-129
LOUISIANA COASTAL PROTECTION AND RESTORATION (LACPR) REPORT
SEE PART 4