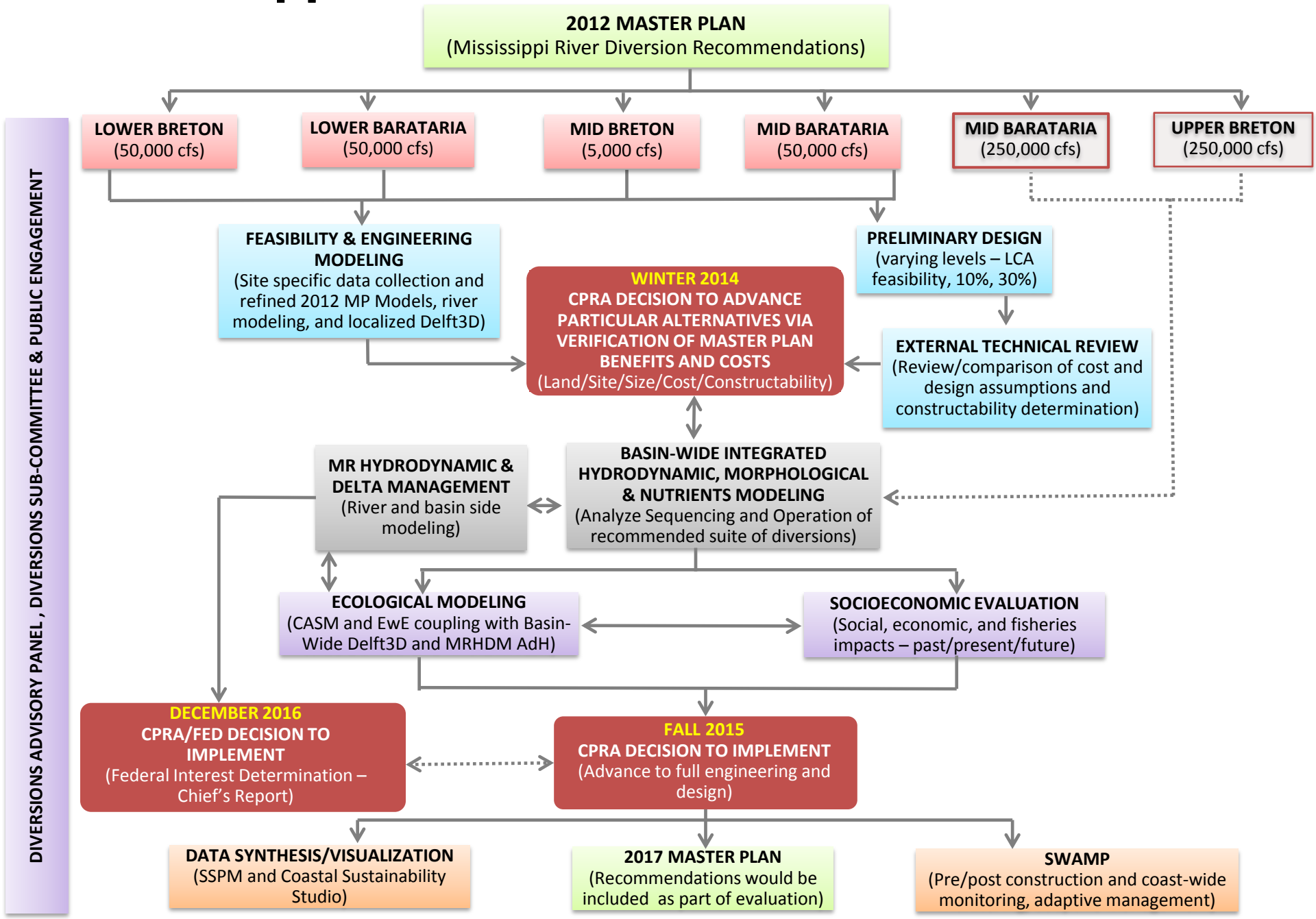
Mississippi River Sediment Diversions: Process



Lower Barataria: BA-163
Lower Breton: BS-023
Sediment Diversions Feasibility

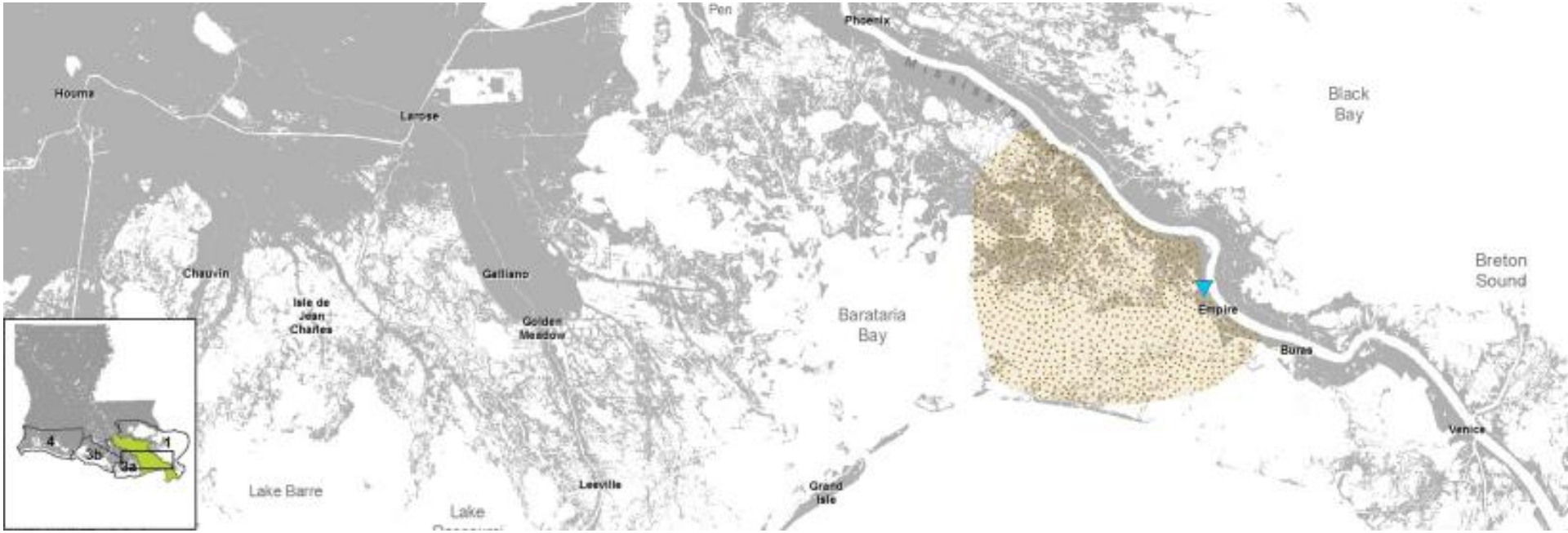
February 12, 2015

Kent Bollfrass
Coastal Resource Scientist

committed to **our coast**

Project Study Area
Master Plan factsheet map

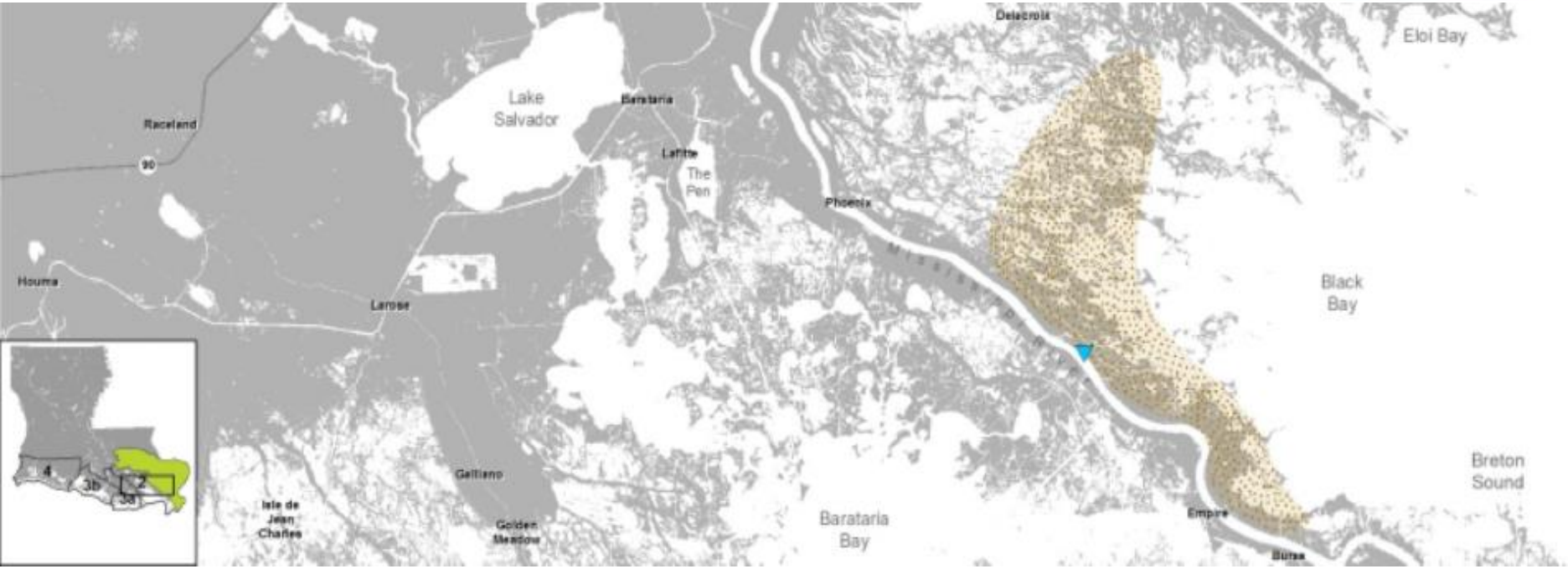
Proposed Lower Barataria Sediment Diversion (50,000 cfs)
Master Plan Project No. 002.DI.15
First Implementation Period



Project Study Area

Master Plan factsheet map

Proposed Lower Breton Sediment Diversion (50,000 cfs)
Master Plan Project No. 001.DI.02
First Implementation Period



Purpose and Need

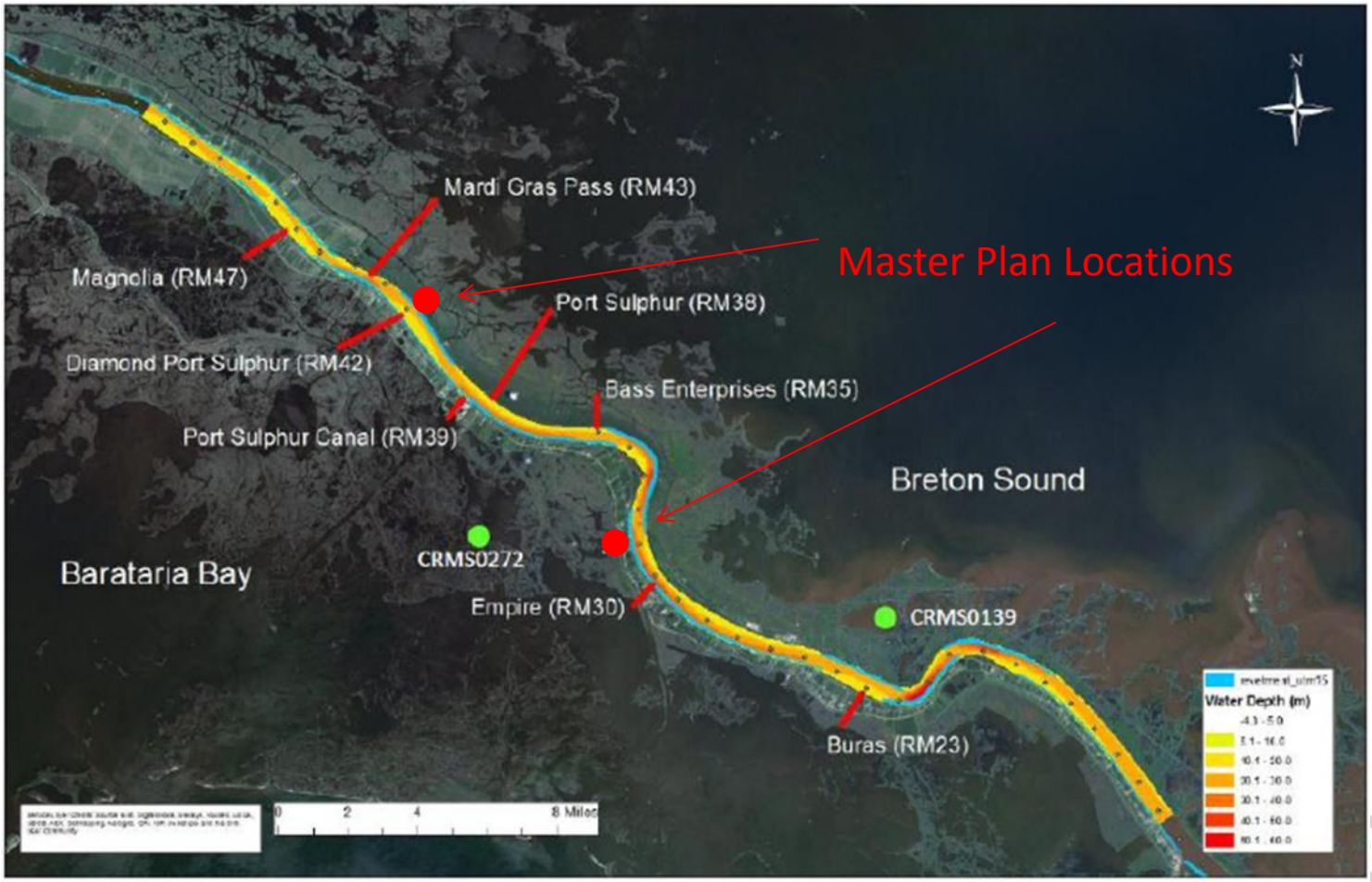
Purpose: Construct sediment diversions to transport sediments from the Mississippi River into the Lower Barataria Basin and Lower Breton Sound Basin to reestablish deltaic processes in order to build, sustain, and maintain wetlands.

Need: In order to achieve, in part, the goals in the 2012 Louisiana Coastal Master Plan, the project is needed to restore the connection between the Mississippi River and the Lower Barataria Basin and Lower Breton Sound Basin to address land loss within each basin caused by reduced sediment input from the river.

Objectives and Constraints

- **Planning Objectives**
  - Maximize the capture of sediment from the Mississippi River, therefore increasing the related potential to build, sustain, and maintain wetlands.
  - Build, sustain and maintain wetlands.
- **Planning Constraints**
  - Do not increase flood risk to coastal communities as evaluated against the FWOP condition
  - Maintain navigation purpose of the Mississippi River as evaluated against the FWOP condition

Lower Diversions Alternatives



Feasibility Modeling

Tools Being Developed:

River Models

- 3D hydrodynamic and sediment transport *(Ehab Meselhe, The Water Institute of the Gulf)*
- Local and regional 3D hydrodynamic and morphological models *(Ehab Meselhe, The Water Institute of the Gulf)*

Basin-side Models

- Revised 2012 MP Ecohydrology *(Alex McCorquodale, UNO, Jenni Schindler,Fentsermaker)*, Vegetation *(Jenneke Visser and Scott Duke Sylvester, UNO)*, and Wetland Morphology *(Brady Couvillion, USGS)* models.
- Site-Specific Delft 3D morphological model using West Bay as an analogue *(Ehab Meselhe, The Water Institute of the Gulf)*

*All models runs will use site specific data *(Mead Allison, The Water Institute and Sam Bentley, LSU)*

What we will evaluate:

- Screening information for site selection:
  - Flow, nutrient and sediment load into the basin
  - Sediment/water ratios
  - Impacts to navigation
  - River morphology
  - Flood stage
  - Long-term assessment (~50 years)
  - Wetland building
  - Future projections of wetland vegetation
  - Guidance for engineering features to stimulate wetland development
  - Impacts to sediment delivery
  - Long term diversion performance
    - RSLR and subsidence
    - Effects on river morphology

Lower Diversions Data Collection

- River Data Collection
  - Multi-beam bathymetry for 15 mile stretch of MR not covered by existing multi-beam data
  - High-discharge Bar Hydrodynamics and Sediment Dynamics
    - River x-sectional and longitudinal velocities
    - Suspended sediment load and bedload
    - Bed grain size

Lower Diversions Data Collection

- Receiving Basin Data Collection
  - Vibracores (5 m) providing subsurface stratigraphy
  - Wetland surface, shallow submerged soil, and submerged soils analyses providing shear stress strength profiles (3 m)
  - Seismic profiling providing continuous stratigraphy (20 m)

Lower Diversions Data Collection

- West Bay Analogue Data Collection
  - Single-beam and multi-beam bathymetry between emergent bars and river outflow
  - Boat-based LIDAR topography of emergent bars
  - Velocity profiles of channels and river outflow
  - Suspended sediment and bedload characteristics
  - Water level, turbidity, salinity, wave current velocity in receiving basin

Lower Diversion Conceptual Design

- Initial screening conceptual design report: very basic designs and preliminary cost estimates on all alternatives
- Final screening conceptual design report: refined, more detailed designs and cost estimates on subset of alternatives

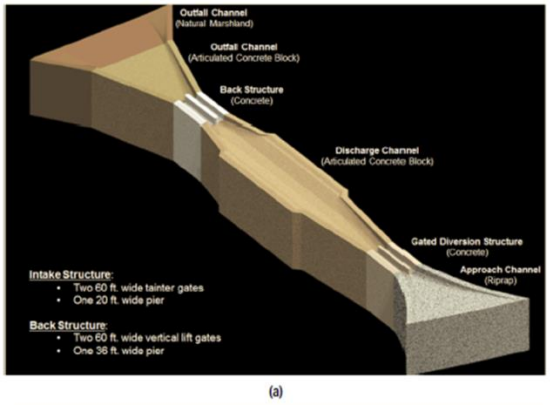
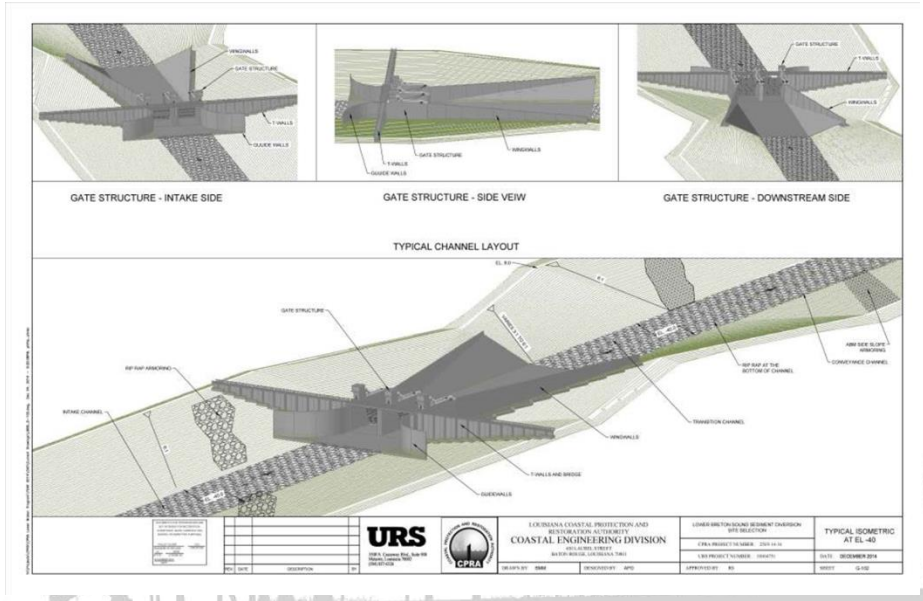
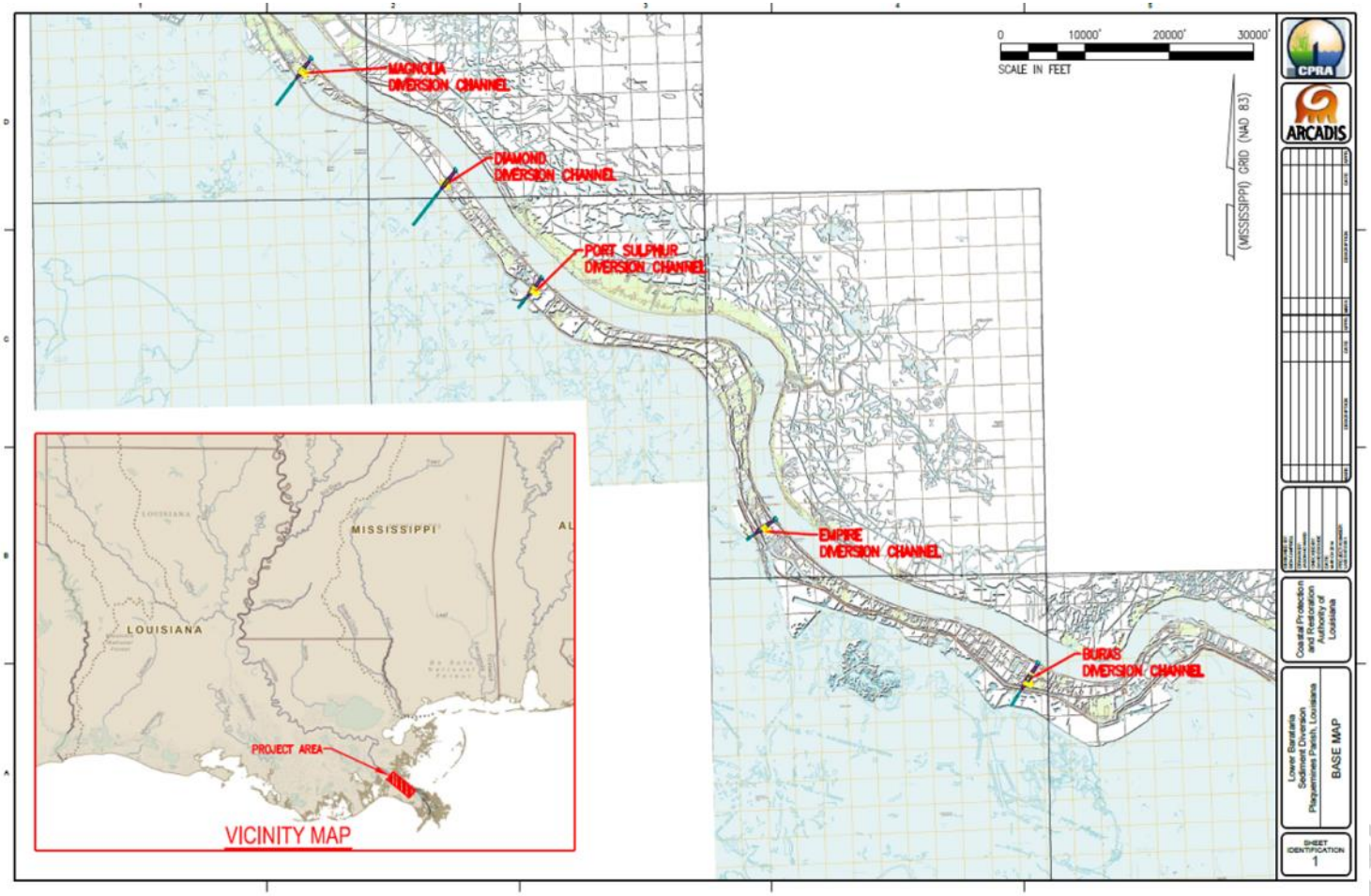


Figure 3.1 LBSD Design Features and Proposed Channel Lining
(a) Oblique, and (b) Plan-View with Elevations



Lower Barataria Initial Screening



Lower Barataria Initial Screening Criteria

Criteria	Magnolia (RM 47)	Diam- PS (RM 42)	P.S. Canal (RM 39)	Empire (RM 30)	Buras (RM 23)
Sediment Capture Efficiency (SWR)					
• Instantaneous	1.9	1.2	0.5	0.7	1.7
• Cumulative	1.2	1.1	0.5	0.7	1.0
Land Created over 50 years (acres)	5634	7290	8945	2768	2175
LGS - Subsurface geology	Neutral	Positive	Positive	Negative	Negative
Design and Const. Cost (**Preliminary**)					
• Construction (million)	$883	$988	$798	$1,009	$1,089
• Land	$501,377	$528,752	$596,878	$1,392,477	$1,987,720
O&M Cost (per year)	$304,330	$304,330	$304,330	$304,330	$304,330
Length of Conveyance Channel (miles)	1.46	1.88	0.89	0.83	1.38
Existing Federal Anchorage Area	Yes	No	No	No	Yes
Existing Revetment	No	Yes	Yes	Yes	Yes
Infrastructure of Concern	No	No	YES	No	No

Lower Barataria Alternative:

Magnolia

River Mile 46.5

REV.	DATE	DESCRIPTION	BY

ARCADIS
Infrastructure · Water · Environment · Buildings
10352 PLAZA AMERICANA DRIVE
BATON ROUGE, LOUISIANA 70816
T. 225.292.1004 | F. 225.218.9677

COASTAL PROTECTION AND RESTORATION AUTHORITY
450 LAUREL STREET
BATON ROUGE, LOUISIANA 70801

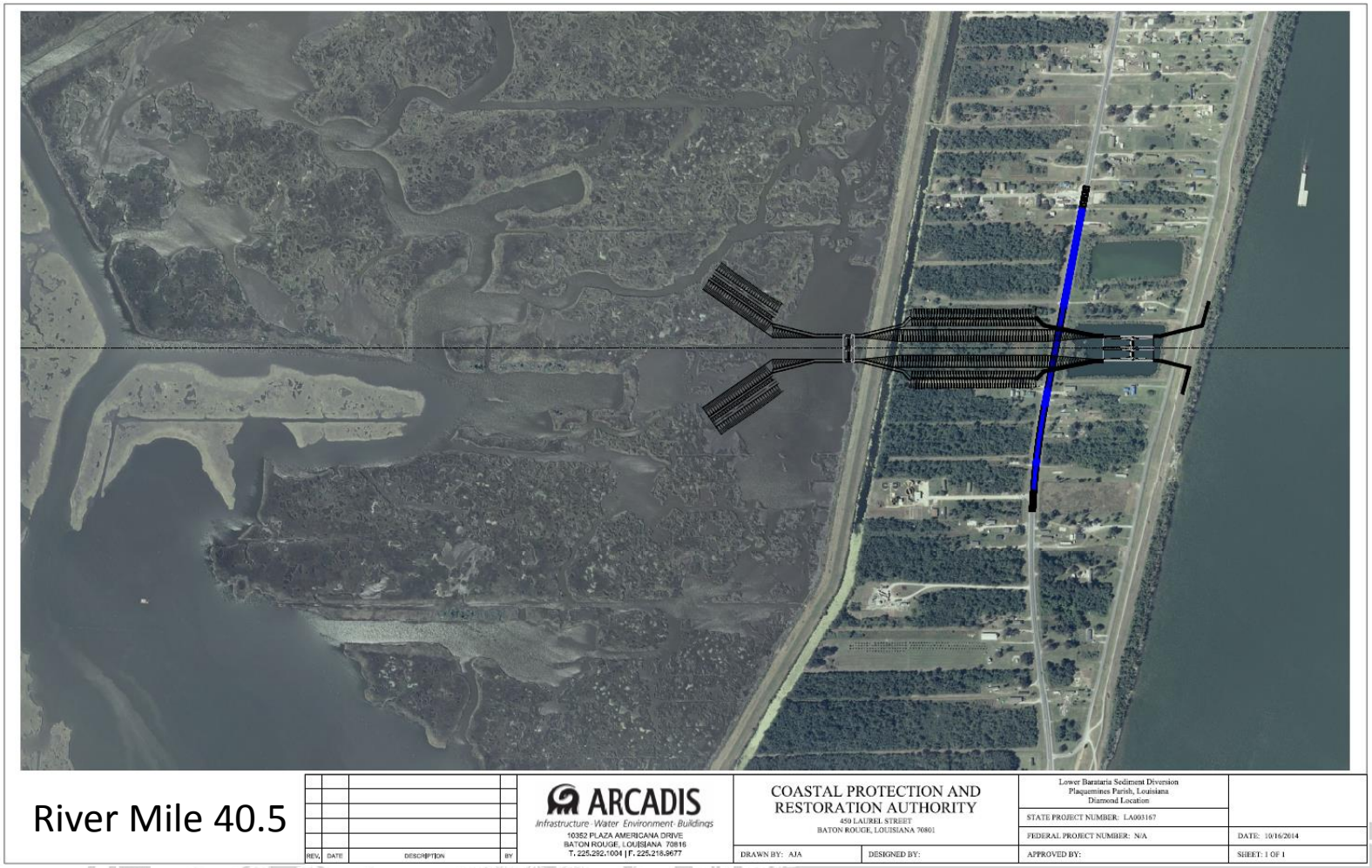
Lower Barataria Sediment Diversion
Plaquemines Parish, Louisiana
Magnolia Location

STATE PROJECT NUMBER: LA003167
FEDERAL PROJECT NUMBER: N/A
DATE: 10/16/2014
SHEET: 1 OF 1

DRAWN BY: AJA
DESIGNED BY:
APPROVED BY:

Lower Barataria Alternative:

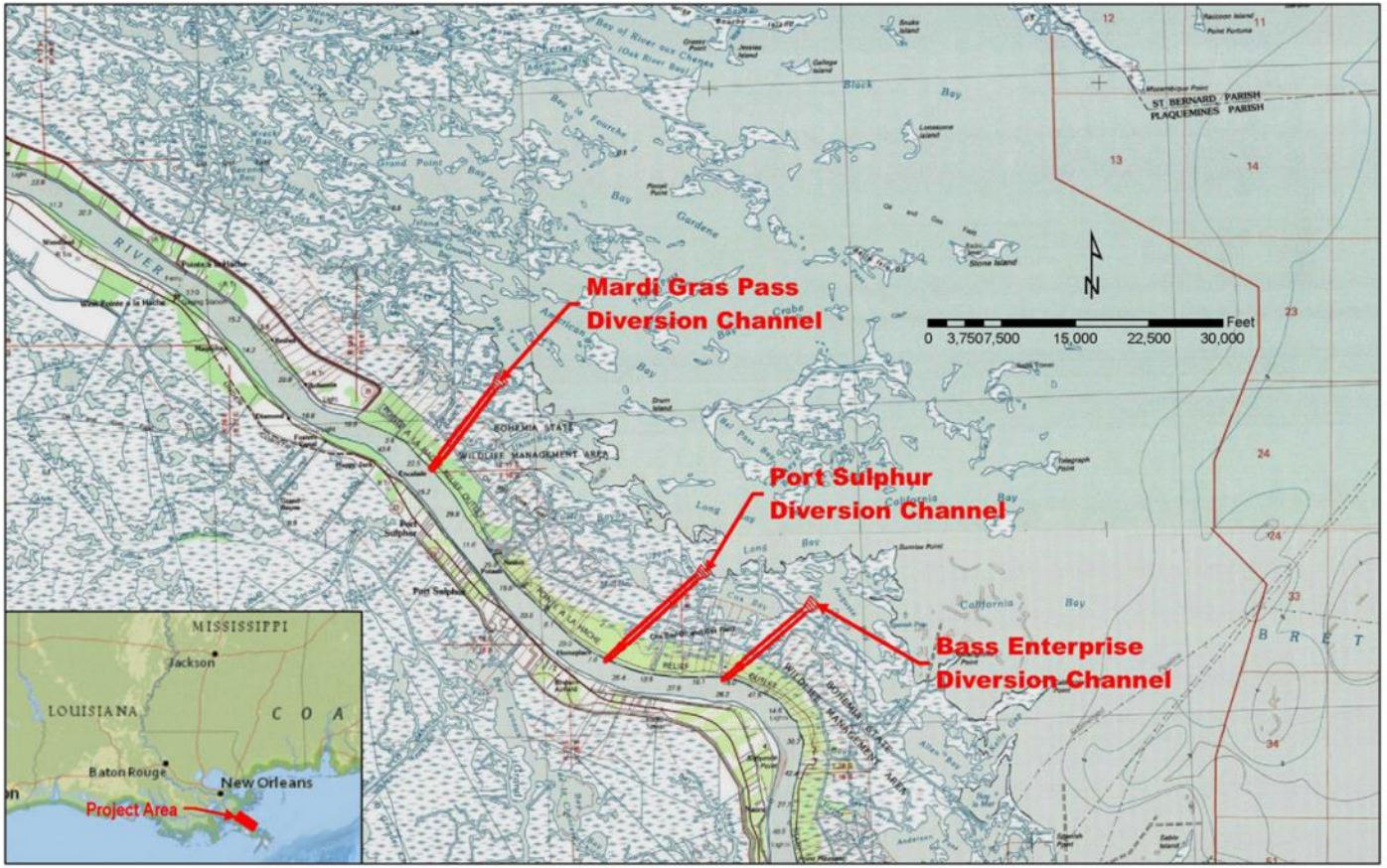
Diamond-Port Sulphur



Lower Barataria Final Screening Criteria

Criteria	Magnolia (RM 46.5)	Diam-P.S. (RM 40.5)	How to Evaluate? [Responsible Party]
Sediment Capture Efficiency (SWR) • Instantaneous • Cumulative	1.9 1.2	1.2 1.1	DELFT 3D River Model [WI]
Land Created over 50 years (acres)	5634	7290	MP 2012 (Revised) [WI]
Design and Const. Cost	$637,750,000	$653,750,000	Cost Est. [ARCADIS]
LGS - Subsurface geology	Neutral	Positive	LGS [CPRA]
Length of Conveyance Channel (miles)	0.65	0.70	Google Earth [WI]
Existing Federal Anchorage Area	Yes	No	CPRA GIS Data Layer [WI]
Existing Revetment	No	No	CPRA GIS Data Layer [WI]
Infrastructure of Concern	No	No	ARCADIS

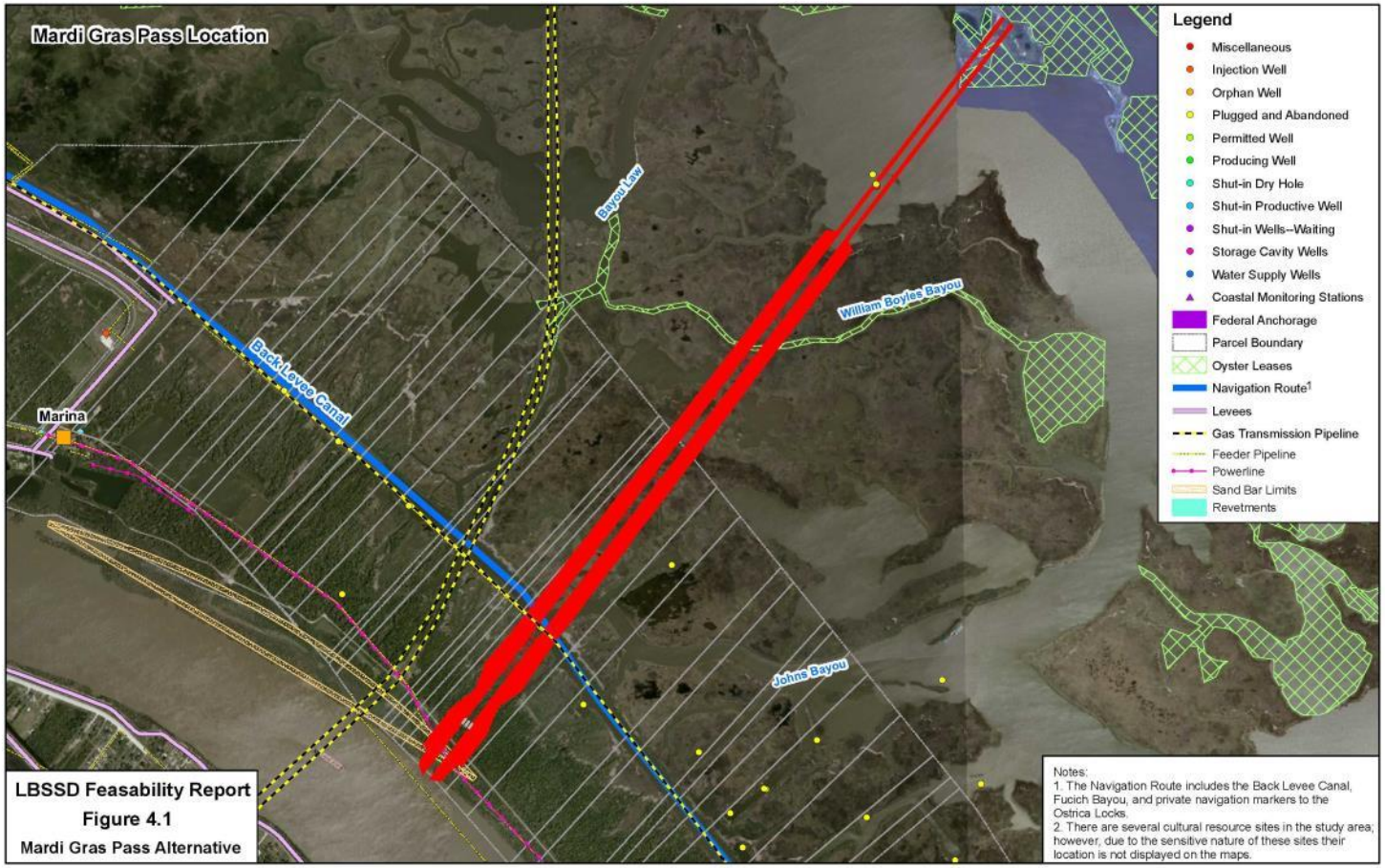
Lower Breton Initial Screening



Lower Breton Initial Screening Criteria

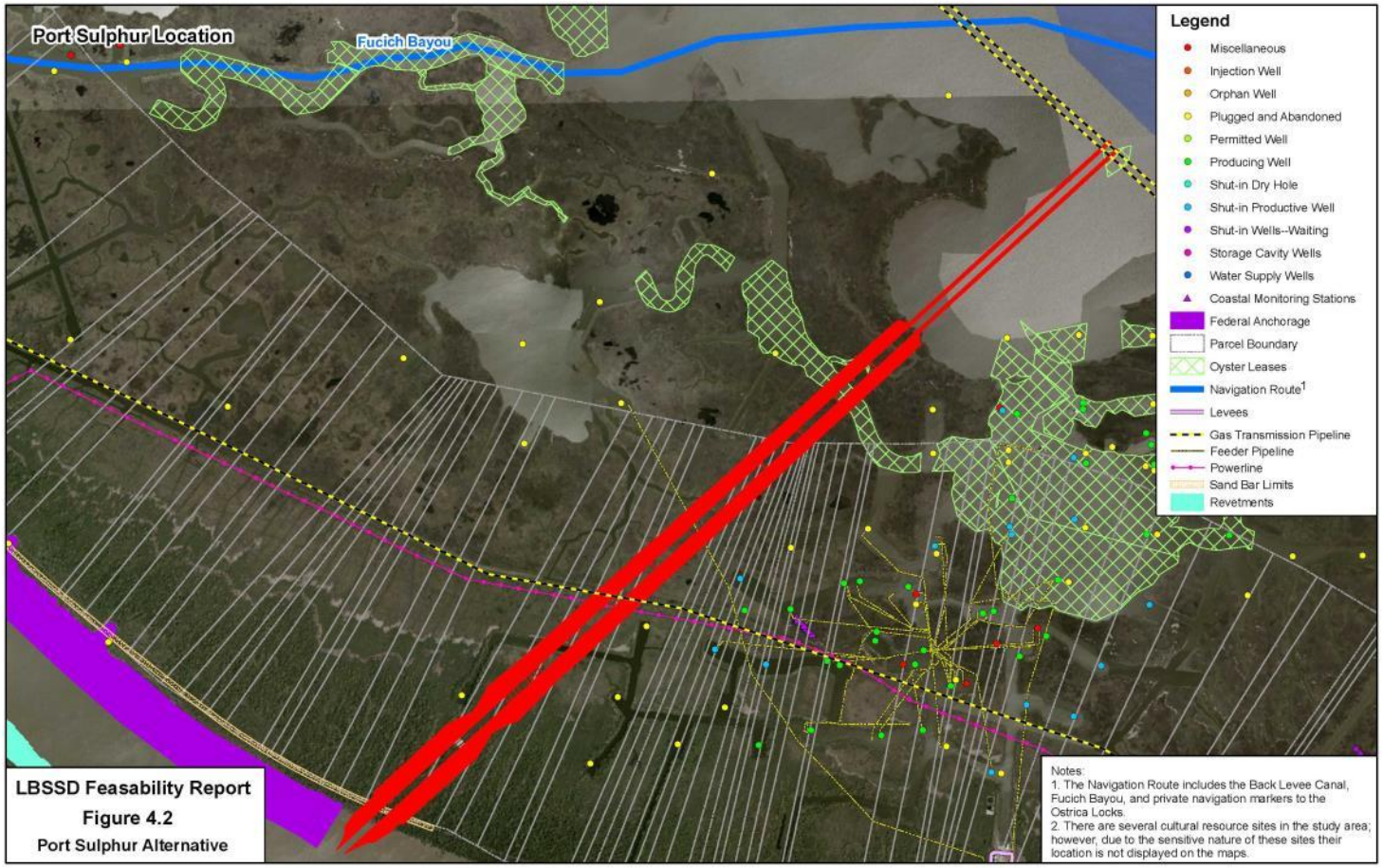
Criteria	Mardi Gras Pass (RM 43)	Port Sulphur (RM 38)	Bass Enterprises (RM 35)	How to Evaluate? [Responsible Party]
Sediment Capture Efficiency (SWR)				
• Instantaneous	1.1	1.7	0.8	DELFT 3D River Model [WI]
• Cumulative	1.2	1.2	0.8	
Acres of Land Created (acres)	3830	4349	5683	MP 2012 (Revised) [WI]
LGS - Subsurface geology	Neutral	Positive	Positive	LGS [CPRA]
Design and Const. Cost (**Preliminary**)				
• Construction (million)	$460	$486	$845	Cost Est. [URS]
• Land	$245,600	$271,000	$562,700	
O&M Cost (per year)	$374,660	$406,460	$395,560	Cost Est. [URS]
Length of Conveyance Channel (miles)	2.81	3.14	1.44	Google Earth [WI]
Existing Federal Anchorage Area	No	Yes	No	CPRA GIS Data Layer [WI]
Existing Revetment	No	No	No	CPRA GIS Data Layer [WI]
Infrastructure of Concern	No	No	YES	(URS)

Lower Breton Alternative:
Mardi Gras Pass



River Mile 43

Lower Breton Alternative:
Port Sulphur



River Mile 38

Lower Breton Final Screening Criteria

Criteria	Mardi Gras Pass (RM 43)	Port Sulphur (RM 38)	How to Evaluate? [Responsible Party]
Sediment Capture Efficiency (SWR) • Instantaneous • Cumulative	1.1 ~~1.2~~	1.7 ~~1.2~~	DELFT 3D River Model [WI]
Acres of Land Created (acres)	3830	4349	MP 2012 (Revised) [WI]
LGS - Subsurface geology	Neutral	Positive	LGS [CPRA]
Design and Const. Cost	$370,793,464	$371,983,254	Cost Est. [URS]
Length of Conveyance Channel (miles)	2.81	3.14	Google Earth [WI]
Existing Federal Anchorage Area	No	No	CPRA GIS Data Layer [WI]
Existing Revetment	No	No	CPRA GIS Data Layer [WI]
Infrastructure of Concern	Back Levee Canal	Downstream P.S Anchorage	URS

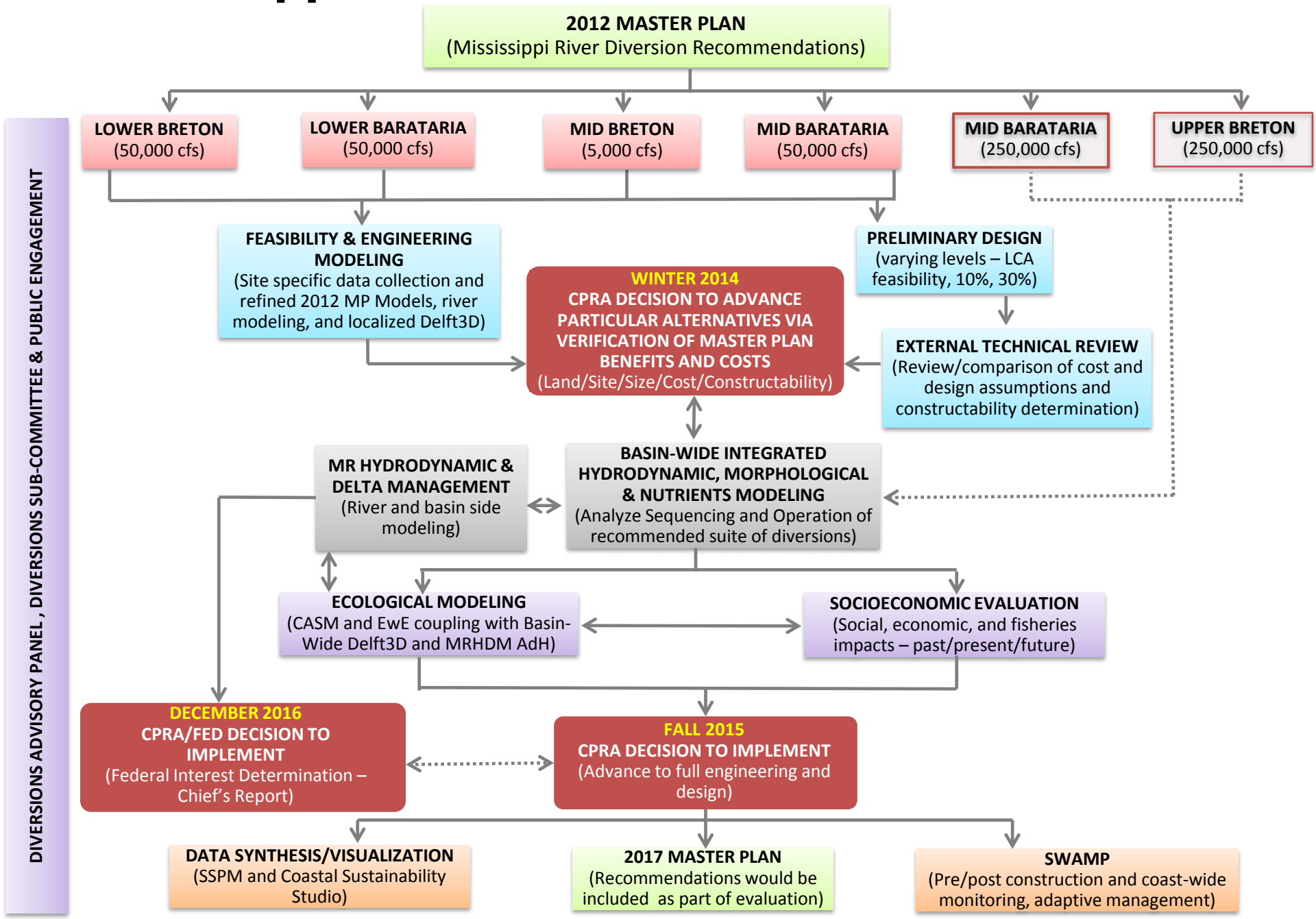
Lower Diversions Next Steps

- Basin-wide and Ecological modeling, Socioeconomic evaluation
- Wetland morphology, Ecohydrology, vegetation production runs on preferred plans
- Feasibility report
- Engineering Independent Technical Review
- General outreach

Lower Diversions Schedule

Milestone	2014	2015											
	D	J	F	M	A	M	J	J	A	S	O	N	D
Plan Selection													
Final Engineering Reports													
Geotech Data Collection (Lower Breton)													
3rd Party Engineering Review													
Feasibility Report													
TSP MP Production Runs													
Basin-wide Delft3d													
Fisheries and Socioeconomic Model													

Mississippi River Sediment Diversions: Process



Questions, comments, discussion

Lower Barataria and Lower Breton Sediment Diversions

Kent Bollfrass, kentbollfrass@la.gov 225.342.4733