



**State of Louisiana  
Department of Natural Resources  
Coastal Restoration Division and  
Coastal Engineering Division**

**2005 Operations, Maintenance,  
and Monitoring Report**

for

**Cheniere Au Tigre Shoreline  
Demonstration**

State Project Number TV-16  
Priority Project List 6

June 2005  
Vermilion Parish

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2005 Operations, Maintenance, and Monitoring Report  
for  
Cheniére Au Tigre Shoreline Demonstration (TV-16)

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## Preface

The Operations, Maintenance, and Monitoring (OM&M) Report format is a streamlined approach which combines the Operations and Maintenance annual project inspection information with the Monitoring data and analyses on a project-specific basis. This report includes monitoring data collected through December 2004, and annual Maintenance Inspections through June 2005.

The 2005 report is the second in a series of reports. For additional information on lessons learned, recommendations, and project effectiveness, please refer to the 2004 Operations, Maintenance, and Monitoring Report on the Louisiana Department of Natural Resources (LDNR) web site at [dnr.louisiana.gov](http://dnr.louisiana.gov) (Barrilleaux and Aucoin 2007).



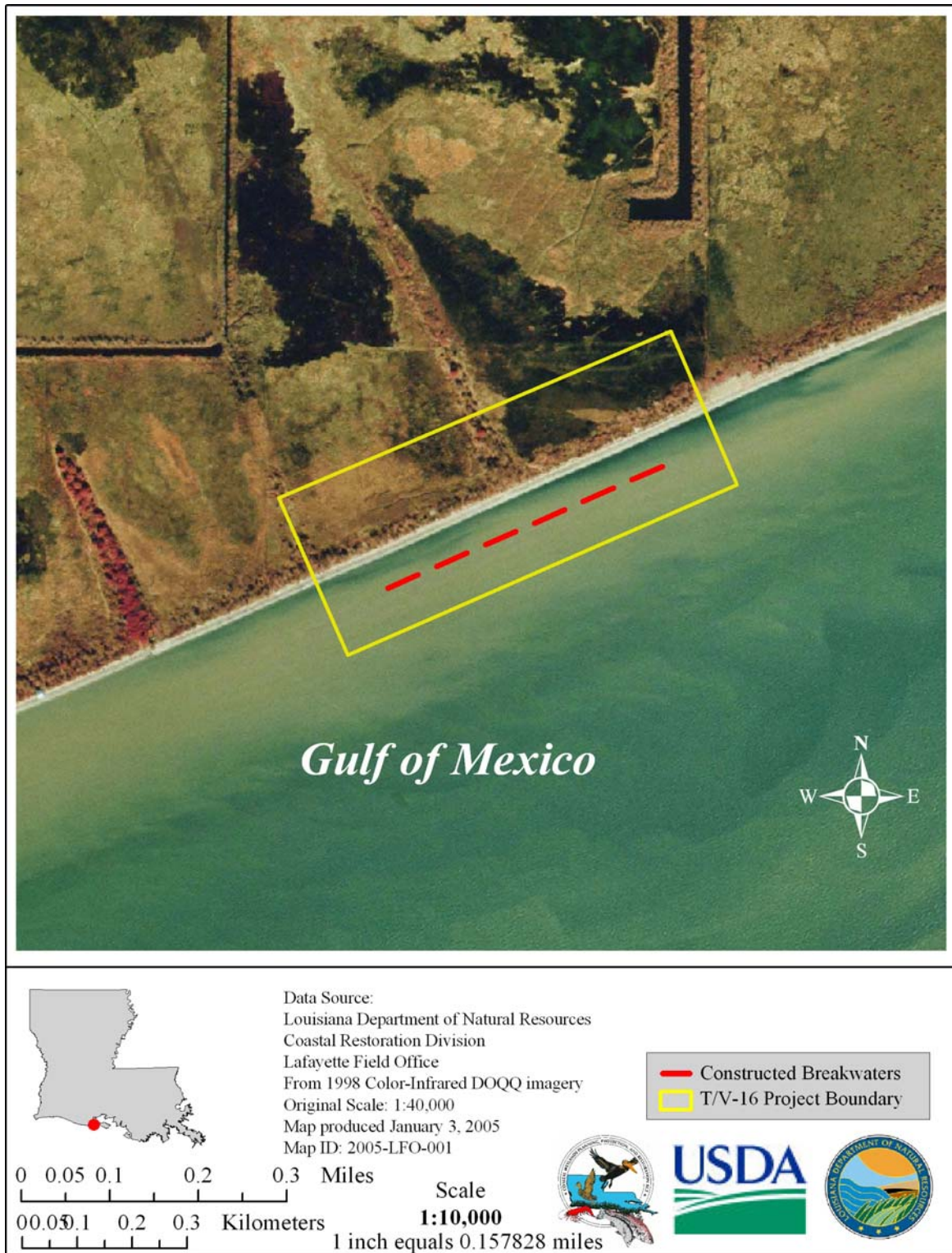
## I. Introduction

The Cheniere au Tigre shoreline demonstration project is from the sixth priority list of the Coastal Wetlands Planning, Protection, and Restoration Act (CWPPRA). The project area is located along the shoreline of the Gulf of Mexico, approximately 15 mi (24 km) south of Intracoastal City, Louisiana, in Vermilion Parish (figure 1). According to the project environmental assessment, the project area comprises approximately 103 acres (41.7 ha), occurring as 38 acres (15.4 ha) of open water, 44 acres (17.8 ha) of brackish marsh, 4 acres (1.6 ha) of coastal beach, 12 acres (4.9 ha) of upland scrub/shrub habitat, and 5 acres of upland forest (2.0 ha). Vegetation occurring adjacent to the shoreline is characterized by *Ambrosia* spp. (giant ragweed), *Acacia smallii* (sweet acacia), *Geranium carolinianum* (wild geranium), *Galium* spp. (bedstraw), and *Opuntia compressa* (prickly pear cactus).

Wetland loss in the project area has occurred as conversion of beach and brackish marsh to open water. Loss of nearly 26 acres (10.5 ha) occurred between 1956 and 1990, as loss of 8 acres (3.2 ha) of coastal beach, 6 acres (2.4 ha) of brackish marsh, and 12 acres (4.9 ha) of scrub/shrub habitat (U.S. Department of Agriculture, Natural Resources Conservation Service 1998). Shoreline retreat in this area between 1956 and 1969 was measured to be 26.6 ft/yr (8.1 m/yr) (Louisiana State University Center for Wetland Resources 1978). Another shoreline change study by Byrnes et al. (1995) found the mean shoreline retreat rate for the chenier plain from Cheniere au Tigre to Southwest Pass to be 9.5 ft/yr (2.9 m/yr) during the period 1883-1994. This loss has resulted primarily from erosional scouring from the same littoral currents that can also contribute to sediment accretion. These littoral currents, from the Atchafalaya River and Wax Lake Outlet to the east, cause sediment accretion during periods of slow littoral currents and scouring as current velocity increases from storms and other anthropogenic factors.

The project design involved the construction of six rock rip-rap breakwater segments, each 200 ft (61 m) long, with a 120-ft (36-m) gap between segments. Breakwater segments were constructed parallel to the shoreline at a distance of 200 ft (61 m) offshore. Settled elevation of the rock segments was 3.5 ft (1 m) (North American Vertical Datum [NAVD] of 1988). The project design utilized results from a previous breakwater project employed at nearby Holly Beach, Louisiana (Underwood et al. 1999). Specifically, the current project used longer breakwaters with smaller gaps between breakwaters, set at a distance as much as 300 ft closer to the shore than those constructed for the Holly Beach project, in order to further reduce wave energies and allow sufficient sediment availability for the westernmost areas of the project. The actual number of breakwater segments constructed was dependent on the costs of the rock rip-rap and construction, and resulted in a total of six breakwater segments. Construction was initiated in July 2001 and completed in September 2001.





**Figure 1.** Location of the Cheniere au Tigre (TV-16) shoreline demonstration project and the locations of the constructed rock breakwaters.



## **II. Maintenance and Operation Activity**

This is a demonstration project, therefore no maintenance, inspections, or operations plans are applicable. A close-out report developed from a future survey will be developed in the final years of the project.





### **III. Monitoring Activity**

#### **a. Monitoring Goals**

The objective of the Cheniere Au Tigre shoreline demonstration project is to protect the beaches and interior brackish marshes through the use of segmented breakwaters.

The following goal will contribute to the evaluation of the above objectives:

1. Protect the acreage of the interior brackish marshes by reducing the rate of beach erosion.

#### **b. Monitoring Elements**

##### **Aerial Photography:**

Near-vertical color-infrared aerial photography (1: 6,000 scale) was used to measure vegetated and non-vegetated areas for the project, updrift, and downdrift areas and to document long-term shoreline changes. The 1: 6,000 scale photography was obtained in 2000 prior to project construction and will be acquired in 2005 following construction. In December 2004, near-vertical color-infrared aerial imagery (1: 8,500 scale) was collected and compared to the pre-construction imagery. An unsupervised classification was performed to determine changes in land/water/beach area within the project. Additional photography may be obtained in response to storm events. The original photography was checked for flight accuracy, color correctness, and clarity and was subsequently archived. Aerial photography was scanned, mosaicked, and georectified by U.S. Geological Survey/National Wetlands Research Center (USGS/NWRC) personnel according to standard operating procedures (Steyer et al. 1995, revised 2000).

#### **c. Preliminary Monitoring Results and Discussion**

##### **Aerial Photography:**

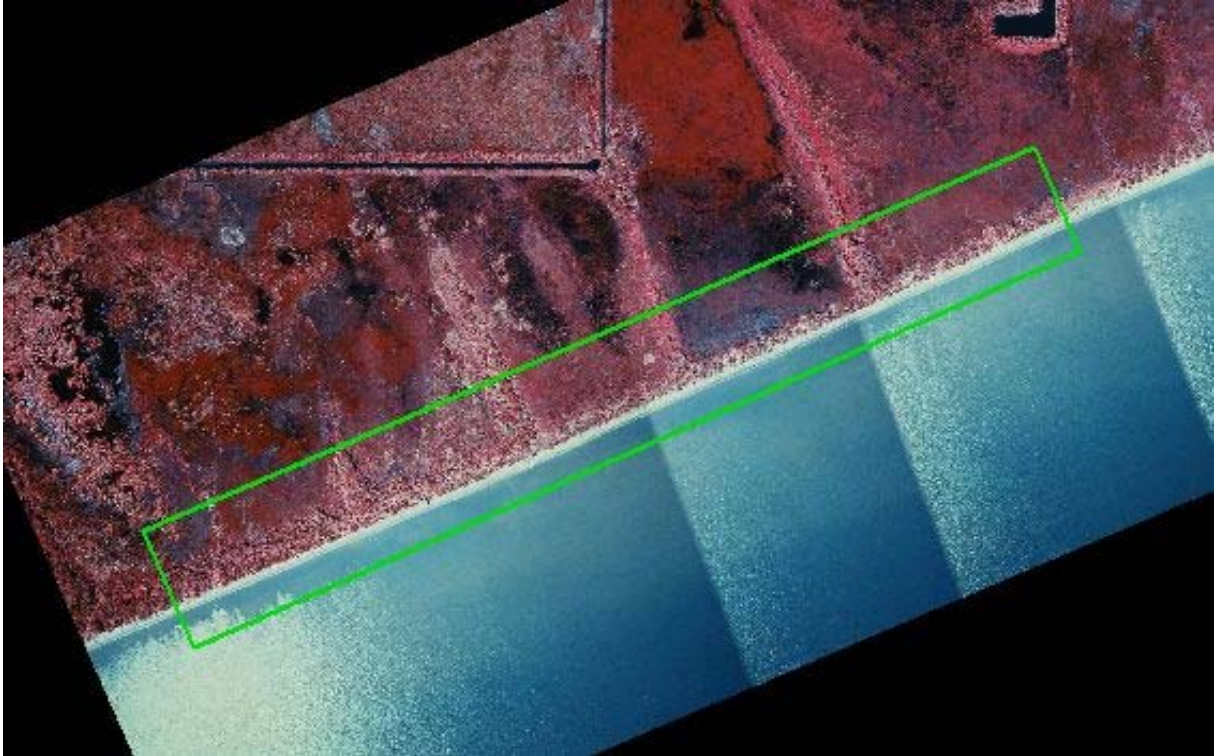
Pre-construction aerial photography acquired in 2000 (figure 2), approximately 10 months prior to construction, indicated that the project area consists of 31 acres (12.5 ha) of land and 29 acres (11.7 ha) of water. Comparison of the pre-construction and 2004 post-construction aerial imagery indicated a 2-acre (0.81-ha) increase in unvegetated beach area within the project (figure 3). However, this increase includes the constructed breakwaters. Additionally, classified acreages are variable, based on water level at the time of aerial image acquisition.

##### **Shoreline Position:**

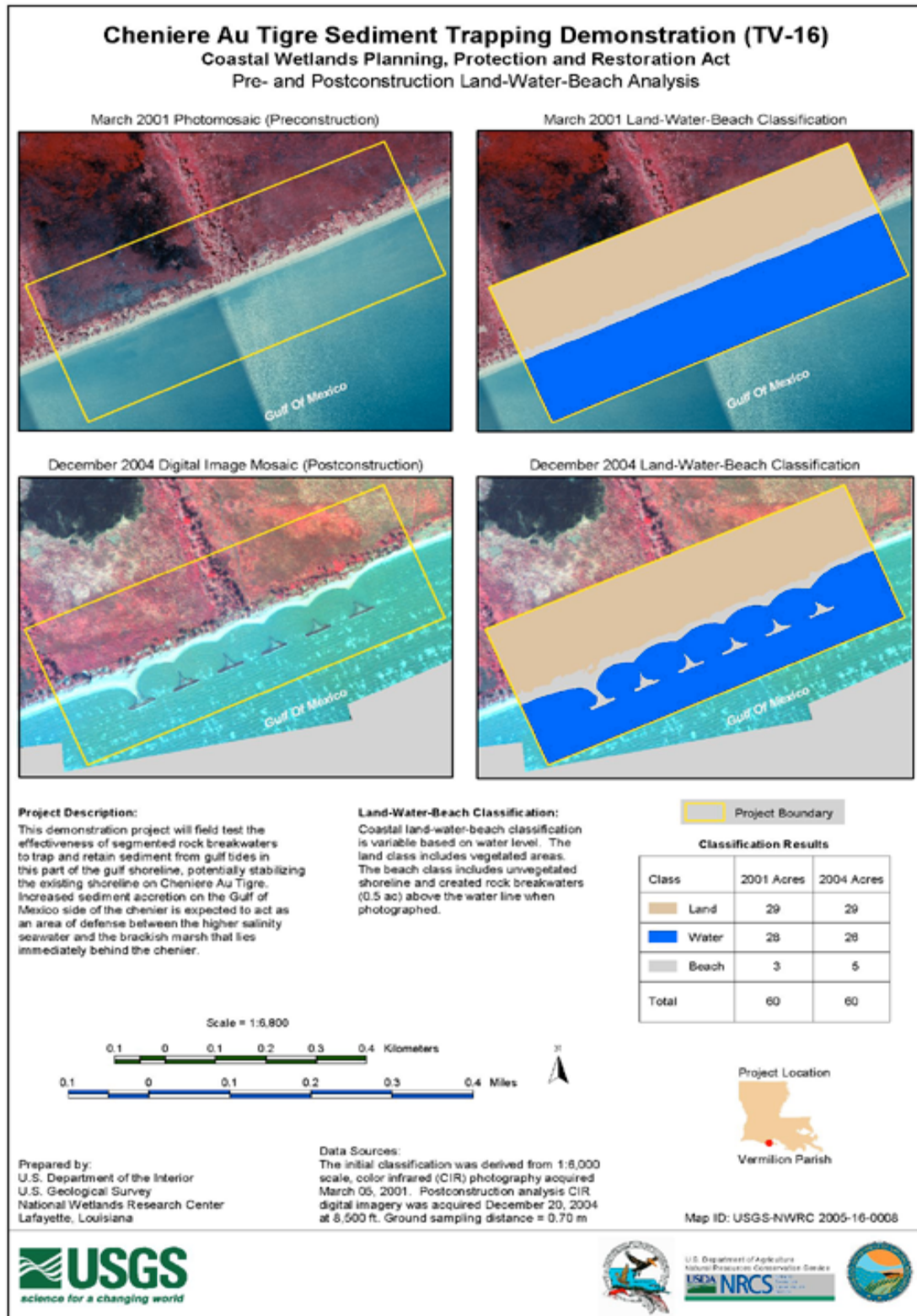
As-built shoreline position was documented in 2002 (figure 4) and although no subsequent shoreline information has been collected, qualitative observations indicate that the shoreline is prograding and sediment is accumulating both along the shoreline and immediately shoreward of the breakwater segments (figures 5 and 6).







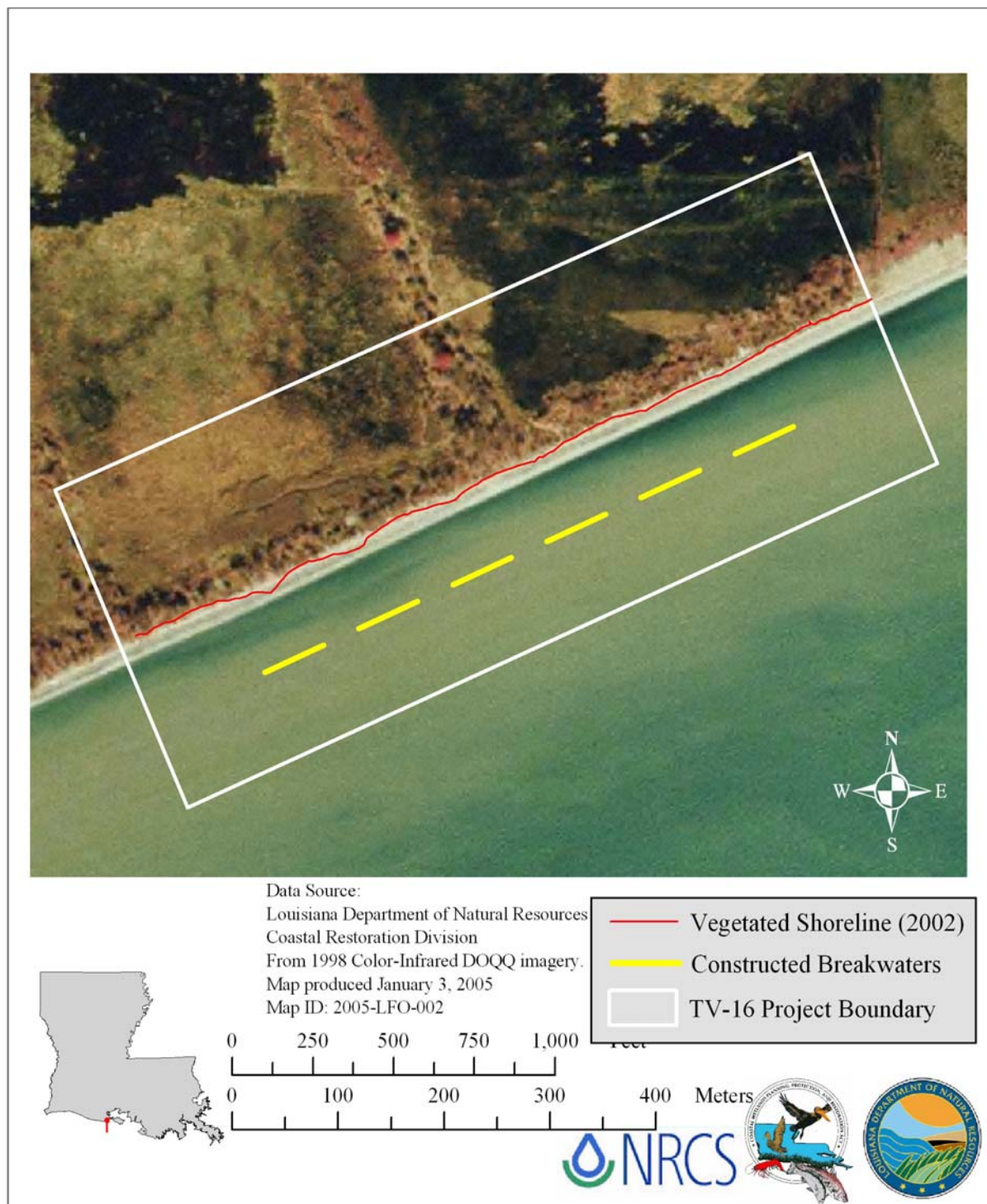
**Figure 2.** 2000 photo mosaic with overlaid project TV-16 boundary acquired approximately 10 months prior to construction.



**Figure 3.** Results of the land/water/beach classification performed three years following TV-16 project construction.







**Figure 4.** Shoreline position of project TV-16 (seaward edge of shoreline vegetation) documented in April 2002 using differentially corrected Global Position System data.



**Figure 5.** Segmented rock breakwater in project TV-16 area, showing foreshore accreted sand approximately 6 months following construction.



**Figure 6.** Shoreline of Cheniere au Tigre, project TV-16.

#### **IV. Conclusions**

##### **a. Project Effectiveness**

The project appears to be functioning as designed. No structural damage was sustained from Hurricane Lili in October 2002. The 2004 land/water/beach classification indicated no erosion of beach or interior marsh within the project area. Some of the increase in beach area may be attributed to sand accretion. Qualitative observations also indicate that the shoreline is prograding and sediment is accumulating both along the shoreline and immediately shoreward of the breakwater segments. The areas adjacent to the rock dike are still experiencing losses due to erosion. The next photography is scheduled for 2005.

##### **b. Recommended Improvements**

An engineering close-out report which includes a survey will be performed in the fall of 2006 outlining the successes/ failures of the project.

##### **c. Lessons Learned**

Initially, this project was a demonstration project intended to use new innovative designs for shoreline protection. Feasible, cost-effective designs could not be developed by construction contractors, therefore rock was eventually incorporated into the design. This project has been so successful that LDNR/Coastal Engineering Division has funded a continuation of the existing project.



## VI. REFERENCES

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- Louisiana State University Center for Wetland Resources 1978. Shoreline erosion in coastal Louisiana: inventory and assessment. Final Report to Louisiana Department of Transportation and Development. Baton Rouge: Louisiana State University Center for Wetland Resources, Louisiana State University. 139 pp.
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## **Appendix A (Inspection Photographs)**

This is a demonstration project, and as such no inspection was conducted, therefore no photographs were available.





## Appendix B (Three-Year Budget Projection)

### CHENIERE AU TIGRE DEMO / TV16 / PPL6 Three-Year Operations & Maintenance Budgets 07/01/2005 - 06/30/08

<u>Project Manager</u>	<u>O &amp; M Manager</u>	<u>Federal Sponsor</u>	<u>Prepared By</u>
		NRCS	
	<b>2005/2006</b>	<b>2006/2007</b>	<b>2007/2008</b>
<b>Maintenance Inspection</b>	\$ -	\$ -	\$ -
<b>Structure Operation</b>	\$ -	\$ -	\$ -
<b>Administration</b>	\$ -	\$ -	\$ -
<b>Maintenance/Rehabilitation</b>			
05/06 Description:			
<i>E&amp;D</i>	\$ -		
<i>Construction</i>	\$ -		
<i>Construction Oversight</i>	\$ -		
<i>Sub Total - Maint. And Rehab.</i>	\$ -		
06/07 Description	Close out survey and report ( \$27,000 @ 50% = \$13,500)		
<i>E&amp;D</i>		\$ -	
<i>Construction</i>		\$ 13,500.00	
<i>Construction Oversight</i>		\$ -	
<i>Sub Total - Maint. And Rehab.</i>		\$ 13,500.00	
07/08 Description:			
<i>E&amp;D</i>			\$ -
<i>Construction</i>			\$ -
<i>Construction Oversight</i>			\$ -
<i>Sub Total - Maint. And Rehab.</i>			\$ -
	<b>2005/2006</b>	<b>2006/2007</b>	<b>2007/2008</b>
<b><u>Total O&amp;M Budgets</u></b>	<b>\$ -</b>	<b>\$ 13,500.00</b>	<b>\$ -</b>



**OPERATION AND MAINTENANCE BUDGET 07/01/2006-06/30/2007**  
**CHENIERE AU TIGRE DEMO/TV-16/PPL6**

DESCRIPTION	UNIT	EST. QTY.	UNIT PRICE	ESTIMATED TOTAL
O&M Inspection and Report	EACH			\$0.00
General Structure Maintenance	LUMP	1	\$0.00	\$0.00
Engineering and Design	LUMP	1	\$0.00	\$0.00
Operations Contract	LUMP	1	\$0.00	\$0.00
Construction Oversight	LUMP	1	\$0.00	\$0.00

**ADMINISTRATION**

LDNR / CRD Admin.	LUMP	0	\$0.00	\$0.00
FEDERAL SPONSER Admin.	LUMP	0	\$0.00	\$0.00
SURVEY Admin.	LUMP	0	\$0.00	\$0.00
OTHER				\$0.00
<b>TOTAL ADMINISTRATION COSTS:</b>				<b>\$0.00</b>

**MAINTENANCE / CONSTRUCTION**

**SURVEY**

SURVEY DESCRIPTION:				
Secondary Monument	EACH	0	\$0.00	\$0.00
Staff Gauge / Recorders	EACH	0	\$0.00	\$0.00
Marsh Elevation / Topography	LUMP	0	\$0.00	\$0.00
TBM Installation	EACH	0	\$0.00	\$0.00
Close Out Survey	LUMP	1	\$13,500.00	\$13,500.00
<b>TOTAL SURVEY COSTS:</b>				<b>\$13,500.00</b>

**GEOTECHNICAL**

GEOTECH DESCRIPTION:				
Borings	EACH	0	\$0.00	\$0.00
OTHER				\$0.00
<b>TOTAL GEOTECHNICAL COSTS:</b>				<b>\$0.00</b>

**CONSTRUCTION**

CONSTRUCTION DESCRIPTION:					
Rip Rap	LIN FT	TON / FT	TONS	UNIT PRICE	
	0	0.0	0	\$0.00	\$0.00
	0	0.0	0	\$0.00	\$0.00
	0	0.0	0	\$0.00	\$0.00
Filter Cloth / Geogrid Fabric	SQ YD	0		\$0.00	\$0.00
Navigation Aid	EACH	0		\$0.00	\$0.00
Signage	EACH	0		\$0.00	\$0.00
General Excavation / Fill	CU YD	0		\$0.00	\$0.00
Dredging	CU YD	0		\$0.00	\$0.00
Sheet Piles (Lin Ft or Sq Yds)		0		\$0.00	\$0.00
Timber Piles (each or lump sum)		0		\$0.00	\$0.00
Timber Members (each or lump sum)		0		\$0.00	\$0.00
Hardware	LUMP	1		\$0.00	\$0.00
Materials	LUMP	1		\$0.00	\$0.00
Mob / Demob	LUMP	1		\$0.00	\$0.00
Contingency	LUMP	1		\$0.00	\$0.00
General Structure Maintenance	LUMP	1		\$0.00	\$0.00
OTHER				\$0.00	\$0.00
OTHER				\$0.00	\$0.00
OTHER				\$0.00	\$0.00
<b>TOTAL CONSTRUCTION COSTS:</b>					<b>\$0.00</b>

**TOTAL OPERATIONS AND MAINTENANCE BUDGET:** **\$13,500.00**



## **Appendix C**

### **(Field Inspection Notes)**

This is a demonstration project, and as such no inspection was conducted, therefore no field notes were available.

