

# **Wetland Delineation Report: Blackstone Minerals B-2 Re-Entry Project**

December 31, 2008  
Revised May 28, 2009

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Wetland Delineation Report:  
*Blackstone Minerals B-2 Re-Entry  
Project*

Endeavor Natural Gas, LP

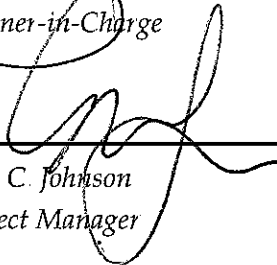
December 31, 2008  
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Project No. 0092408



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*Todd H. Hall, P.E.  
Partner-in-Charge*



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*Erin C. Johnson  
Project Manager*

**Environmental Resources Management Southwest, Inc.**  
15810 Park Ten Place, Suite 300  
Houston, Texas 77084-5140  
T: 281-600-1000  
F: 281-600-1001

## **TABLE OF CONTENTS**

<b>EXECUTIVE SUMMARY</b>	<b><i>iv</i></b>
<b>GLOSSARY</b>	<b><i>v</i></b>
<b>1.0 INTRODUCTION</b>	<b>1</b>
1.1 OBJECTIVES AND TECHNICAL APPROACH	1
1.2 SITE HISTORY	2
1.3 REGULATORY BACKGROUND	2
<b>2.0 SURVEY METHODS</b>	<b>5</b>
2.1 DESKTOP ANALYSIS	5
2.2 FIELD SURVEY	5
2.2.1 Wetlands	6
2.2.2 Swales	7
2.2.3 Uplands	7
<b>3.0 RESULTS</b>	<b>8</b>
3.1 WETLANDS	8
3.2 SWALE	9
3.3 UPLANDS	10
<b>4.0 SUMMARY AND CONCLUSIONS</b>	<b>11</b>
<b>5.0 REFERENCES</b>	<b>12</b>
5.1 ENVIRONMENTAL INVESTIGATORS	12
5.2 REFERENCE DOCUMENTS	12
 <b>APPENDICES</b>	
<b>A FIELD DATA SHEETS</b>	
<b>B PHOTOGRAPHIC LOG</b>	

## ***TABLE OF CONTENTS (Cont'd)***

### ***List of Figures***

<b><i>1-1</i></b>	<b><i>Project Vicinity Map</i></b>
<b><i>2-1</i></b>	<b><i>Aerial Map</i></b>
<b><i>3-1</i></b>	<b><i>Soils Map</i></b>
<b><i>3-2</i></b>	<b><i>Topographic Map</i></b>
<b><i>3-3</i></b>	<b><i>NWI Map</i></b>
<b><i>3-4</i></b>	<b><i>Floodplain Map</i></b>



## **EXECUTIVE SUMMARY**

Environmental Resources Management Southwest, Inc. (ERM) completed a wetland delineation in November 2008 for the area to be disturbed as part of the proposed Endeavor Natural Gas, L.P. (Endeavor) production of the existing Blackstone Minerals B-2 well in Hardin County, Texas ("the Project"). Proposed project activities include directionally drilling from a distance of approximately 1,800 feet from an existing surface location outside of Big Thicket National Preserve ("the Preserve"), to reach a bottomhole located underneath the Beaumont Unit within the Preserve.

The wetland delineation was performed within the approximately two-acre project site ("Site") in order to detect the presence of United States Army Corps of Engineers (USACE) jurisdictional wetlands and waterbodies that, if present, could potentially be impacted by Project activities.

No areas were identified within the survey area that met the three parameters (vegetation, soils, and hydrology) of a wetland, as defined in the USACE's 1987 Manual. One erosional swale (SAHA001) was identified within the eastern portion of the site. The swale is fed from the north by runoff from agricultural land that flows over the Site and drains south of the Site into an adjacent mixed bottomland hardwood -cypress forest. The mixed bottomland hardwood -cypress forest, a National Wetland Inventory (NWI) mapped feature, abuts the Lower Neches Valley Authority (LNVA) Canal, a relatively permanent waterbody (RPW), approximately 1,250 feet south of the Site.

ERM suggests that the swale should not fall under the jurisdiction of the Clean Water Act (CWA) and the USACE, as there is an insignificant indirect connection between the swale and the LNVA canal, an RPW that could only exist immediately following rain events, during which the swale collects storm water from the surrounding uplands. However, ERM recommends that this opinion be verified with the USACE, as only the USACE and the U.S. Environmental Protection Agency can make that final determination. If the USACE concurs that the swale is not a jurisdictional feature, no permitting is required in relation to wetland/waterbody impacts. If, instead, the swale is classified by the USACE as a "Water of the U.S.", ERM recommends that Project-related impacts to this feature be permitted under Nationwide Permit (NWP) 43.

## **GLOSSARY**

CFR	Code of Federal Regulations
CWA	Clean Water Act
EPA	Environmental Protection Agency
ERM	Environmental Resources Management Southwest, Inc.
FAC	Facultative Plants
FACU	Facultative Upland Plants
FACW	Facultative Wetland Plants
FEMA	Federal Emergency Management Agency
GPS	Global Positioning System
LNVA	Lower Neches Valley Authority
NRCS	Natural Resources Conservation Service
NWI	National Wetland Inventory
NWP	Nation Wide Permit
OBL	Obligate Wetland Plants
PEM	Palustrine Emergent Wetland
PFO	Palustrine Forested Wetland
PSS	Palustrine Scrub Shrub
RPW	Relatively Permanent Waterbody
TNW	Traditional Navigable Water
UPL	Obligate Upland Plants
US	United States
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey

## 1.0

### **INTRODUCTION**

During November 2008, Environmental Resources Management Southwest, Inc. (ERM) completed a wetland delineation to detect the presence of United States Army Corp of Engineers (USACE) jurisdictional wetlands and waterbodies that could potentially be affected by the proposed Endeavor Natural Gas, L.P. (Endeavor) production of the existing Blackstone Minerals B-2 well in Hardin County, Texas (herein referred to as "the Project"). The Project is located approximately three miles east of Interstate Highway (IH)-69 on Burge Road (Figure 1-1).

The methods and results for the wetland delineation are presented in this report. Additionally, this report includes Project maps, copies of field data sheets (Appendix A), and a photographic log (Appendix B).

## 1.1

### **OBJECTIVES AND TECHNICAL APPROACH**

Endeavor is proposing to re-enter, drill and produce the existing Blackstone Minerals B-2 well (this activity is herein referred to as "the Project") in Hardin County, Texas. Project activities include directionally drilling for a distance of approximately 1,800 feet from outside of the Big Thicket National Preserve ("the Preserve"), to reach a bottomhole location underneath the Beaumont Unit within the Preserve. The area from which the drilling will be initiated is referred to herein as "the Site" and represents the surface area that will potentially be disturbed as a result of the Project, located on private property outside of the Preserve. If the well is completed as a producing well, existing flowlines within the Site would be utilized and new production facilities would be constructed within the Site.

The Site is approximately two (2) acres of previously disturbed fenced property. Prior to the start of construction, vegetation will be cleared from within the fenced boundary and stormwater facilities (*e.g.* culverts, timber matting or other sediment erosion control measures) may be assembled within the Site.

The Project is needed to address the shortage of clean and natural forms of energy for the state of Texas. Endeavor has permitted with the Railroad Commission of Texas for the re-entry operation of the well (API #4219932791), formerly drilled and operated by Mariner Energy Inc. The Project will recomplete the previously produced Yegua EY 1 natural gas reservoir and produce the remaining reserves expected from detailed geological and engineering studies performed by Endeavor.

The objectives of this assessment were to conduct an environmental survey to assess whether any wetlands and/or waterbodies are present in the Site and, if present, to determine if the features are under the jurisdiction of the USACE in

order to determine what permitting requirements will be needed to conduct the work.

To address those objectives, ERM conducted a wetland delineation at the Site. This included a desktop analysis of publicly-available information and a field survey of the Site.

## **1.2 SITE HISTORY**

The Project will take place on property that is currently being leased by Endeavor from Blackstone Minerals Company, L.P. The existing well pad on the Site has been owned in the recent past by several different oil and gas exploration companies, the most recent being Mariner Energy Company, L.P. As part of the original development, the Site was, and remains, covered by caliche rock, gravel and other stabilizing materials. Though the Site has not been actively used within the past five years, the Site is still considered an industrial property.

The Site is surrounded by an approximately eight-foot high chain-link fence, and is bounded by Burge Road to the north and a forest to the south. The Lower Neches Valley Authority (LNVA) canal is located approximately 1,250 feet south of the Site. The natural landscape surrounding the rest of the Site is upland forest, private agriculture/pasture land to the west, east, and north, and an expansive mixed bottomland hardwood-cypress forest to the south.

## **1.3 REGULATORY BACKGROUND**

Features under the jurisdiction of the USACE include "waters of the U.S.". The USACE regulates "waters of the U.S.", including wetlands and special aquatic sites under Section 404 of the Clean Water Act (CWA) and Section 10 of the Rivers and Harbors Act. The USACE and the U.S. Environmental Protection Agency (EPA) define wetlands as "those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands typically include swamps, marshes, bogs, and other similar areas." This definition takes into consideration three distinct environmental parameters: hydrology, soil, and vegetation. Positive wetland indicators of all three parameters are typically present in wetlands.

The term "waters of the U.S." are defined as follows:

- a. All waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide; known as traditional navigable waters (TNWs);

- b. All interstate waters including interstate wetlands;
- c. All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sand flats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation or destruction of which could affect interstate or foreign commerce including any such waters:
  - 1. Which are or could be used by interstate or foreign travelers for recreational or other purposes; or
  - 2. From which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or
  - 3. Which are used or could be used for industrial purpose by industries in interstate commerce;
- d. All impoundments of waters otherwise defined as waters of the U.S. under the definition;
- e. Tributaries of waters identified in paragraphs (a) through (d) above;
- f. The territorial seas;
- g. Wetlands adjacent to waters (other than waters that are themselves wetlands) identified in paragraphs (a) through (g).
  - 1. The term "adjacent" means bordering, contiguous, or neighboring. Wetlands separated from other waters of the U.S. by man-made dikes or barriers, natural river berms, beach dunes and the like are "adjacent wetlands."
- h. Waste treatment systems, including treatment ponds or lagoons designed to meet the requirements of the CWA (other than cooling ponds as defined in 40 Code of Regulations (CFR) 123.11(m) which also meet the criteria of this definition) are not waters of the U.S.
- i. Waters of the U.S. do not include prior converted cropland. Notwithstanding the determination of an area's status as prior converted cropland by any other federal agency, for the purposes of the CWA, the final authority regarding CWA jurisdiction remains with the EPA.

In 2006, the Supreme Court addressed the jurisdictional scope of Section 404 of the CWA, specifically the term "the waters of the U.S.," in *Rapanos v. U.S.* and in *Carabell v. U.S.* The decision provides two new analytical standards for determining whether water bodies that are not TNWs, including wetlands adjacent to those non-TNWs, are subject to CWA jurisdiction:

- 1. If the waterbody is relatively permanent, or if the waterbody has a wetland that directly abuts (e.g., the wetland is not separated from the tributary by uplands, a berm, dike, or similar feature) a relatively permanent waterbody (RPW), otherwise known as the Plurality Test.

2. If a waterbody, in combination with all wetlands adjacent to that waterbody, has a significant nexus with TNWs, which can be determined using the Kennedy Test.
  - a. Justice Kennedy stated during *Rapanos* that “wetlands possess the requisite nexus, and thus come within the statutory phrase ‘navigable waters,’ if the wetlands, either alone or in combination with similarly situated lands in the region, significantly affect the chemical, physical, and biological integrity of other covered waters more readily understood as ‘navigable.’”

## **2.0 SURVEY METHODS**

### **2.1 DESKTOP ANALYSIS**

Prior to conducting the field activities, a desktop analysis of the Site was performed by reviewing the following sources:

- U.S. Geological Survey (USGS) 7.5-minute Topographic Quadrangle Maps;
- U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) Maps;
- Aerial Photograph (2004);
- U.S. Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS) County Soil Surveys; and
- Federal Emergency Management Agency (FEMA) Flood Hazard Maps.

The analysis of these documents assisted in the planning and execution of the field surveys.

### **2.2 FIELD SURVEY**

The survey was conducted on November 13, 2008, by a crew of two trained biologists. The survey was conducted for the Site, an approximately two-acre fenced area. The boundary of the Site is shown on Figure 2-1.

Surveys were performed using common wetland survey tools such as shovels, Munsell Soil Color Charts, USACE field data sheets, and plant indicator lists. The survey also employed visual observations to identify plants and assess relative plant density within the survey area. The survey crew implemented the three-parameter approach set forth in the 1987 USACE Wetland Delineation Manual (USACE 1987) to determine the boundaries of potential wetlands within the survey area. Survey results are presented in Section 3.1. The three-parameter approach assessed vegetation, soils, and hydrology for wetland conditions. Evaluation of these parameters is discussed below.

In addition to evaluating the Site for the presence of wetlands, the field assessment identified waterbodies that were located within the Site.

Field data were recorded on standard USACE Wetland Delineation sheets (Appendix A) to document wetland and upland plant communities, hydrology parameters, and soil conditions during the survey. Identified wetland and waterbody boundaries were marked in the field using sub-meter Global Positioning System (GPS) technologies in accordance with the USACE Galveston District GPS Survey protocol (USACE Galveston District Memorandum, October 22, 2003).

### 2.2.1

## *Wetlands*

### *Vegetation*

The vegetation within the Site was surveyed to determine whether there were dominant plant types and species that are characteristic of wetlands. The plants were classified according to the National List of Plant Species that Occur in Wetlands: Region 6 (Reed 1988). The 'indicator status' identifies a range of probability that an individual species will be found in wetland or upland areas in a particular region. Vegetation identified within the Site is presented in Section 3.1.

Obligate wetland (OBL) plants are those found within wetlands more than 99 percent of the time. Facultative wetland (FACW) plants are found in wetlands 67 to 99 percent of the time. Facultative (FAC) plants are found in wetlands 33 to 66 percent of the time. Facultative upland (FACU) plants are found in wetlands one to 33 percent of the time. Obligate upland (UPL) plants are found in wetlands less than one percent of the time. The indicator status is further defined by a '+' or '-' referencing the wetter or drier ends, respectively, of the probability range. If more than 50 percent of the dominant species in a community are found to have wetland indicator status of OBL, FACW, or FAC (excluding FAC-), the plant community is determined to be hydrophytic or 'wetland'.

### *Hydric Soils*

The Site was inspected for the presence of hydric soils, which indicate the potential for saturated, flooded, or ponded conditions that support the growth and regeneration of hydrophytic or 'wetland' vegetation. Hydric soil indicators include soil color, structure, organic content, and the presence of reducing conditions. Color characteristics (Hue, Value, and Chroma) were recorded using Munsell Soil Color Charts (Kollmorgen Corporation 1990).

Soils were examined in the field by hand-excavating test pits ranging from 6 to 12 inches in diameter and 12 to 20 inches deep in areas exhibiting different plant communities. Soil types were determined based on the criteria for hydric (wetland) or non-hydric (non-wetland) soils as outlined in the USACE Wetland Delineation Manual. Soils identified within the Site are presented in Section 3.1.

### *Hydrology*

Hydrological characteristics were determined by field observation as well as examining aerial photography, USGS topographic maps, NWI Maps, and FEMA Flood Hazard Maps to identify distinct features typically associated with wetlands, wetland habitats, and waterbodies. Field observations were made to determine if primary and secondary indicators of hydrology, as outlined in the



USACE Wetland Delineation Manual, were present in the Site. Hydrology indicators identified within the Site are presented in Section 3.1.

#### *Wetland Characterization*

As required by the USACE, wetlands were classified according to the Cowardin System, as described in *Classification of Wetlands and Deepwater Habitats of the United States* (1979). The wetlands were classified into one or a combination of the following groups: palustrine emergent (PEM), palustrine scrub/shrub (PSS) or palustrine forested (PFO). PEM wetlands are those wetlands that are dominated by erect, rooted, herbaceous plants. PSS wetlands are those wetlands that are dominated by woody vegetation less than 20 feet tall. PFO wetlands occur in undisturbed, forested areas and are often associated with streams.

#### **2.2.2**      *Swales*

Waterbodies and swales identified within the Site were identified and surveyed. Perennial or intermediate waterbodies were differentiated according to size: minor, intermediate, and major. Minor waterbodies are 10 feet or less in width from water's edge to water's edge; intermediate waterbodies range in width from > 10 feet to < 100 feet; major waterbodies are 100 feet or greater in width. Applicable data were gathered for the waterbody feature, including: bank height, bank slope, stream-flow, direction and type, water appearance, stream substrate, aquatic habitats, channel conditions, and disturbances. Data were documented on Waterbody Data Sheets, which are provided in Appendix A. Waterbodies identified within the survey area are described in Section 3.2.

#### **2.2.3**      *Uplands*

As required by the USACE, upland [non-wetland] samples were collected within the Site and were identified (based on vegetation, hydrology and soil parameters). Typical indicators of habitat included species composition, soil saturation levels, soil composition, and elevation. Upland data were recorded on USACE Wetland Delineation sheets (Appendix A).

### 3.0

## RESULTS

The results of the environmental field surveys for the Site are presented in the following sections. Completed field data sheets are presented in Appendix A and a photographic log is provided in Appendix B.

The results presented in this report are based on review of available current and historical information, a desktop evaluation, and the formal wetland delineation conducted on November 13, 2008.

### 3.1

## WETLANDS

**No areas were identified within the Site that met the three parameters (vegetation, soils, and hydrology) of a wetland.**

### *Vegetation*

The vegetation in the Site was characterized by various shrub/scrub species with a small stand of young loblolly pines (*Pinus taeda*) less than five years old. The vegetation present in the Site included: eastern baccharis (*Baccharis halimifolia*) which has a indicator status of FACW-, bushy bluestem (*Andropogon glomeratus*) which has an indicator status of FACW+, annual marsh elder (*Iva annua* L.) which has an indicator status of FAC, giant goldenrod (*Solidago gigantea*) which has an indicator status of FAC, loblolly pine (*Pinus taeda*) which has an indicator status of FAC-, and rough dropseed (*Sporobolus asper*) which has an indicator status of FACU-. Four of the six dominant species present in the survey area are considered hydrophytic vegetation.

### *Soils*

According to the USDA NRCS Soil Survey for Hardin County 2008, the general soil series within the Site is listed as Spurger very fine sandy loam (Figure 3-1). Spurger very fine sandy loam is typically found in association with terrace riser landforms with a 0 to 2 percent slope and is moderately well drained. While the Caneyhead component, which only makes up five percent of this soil series, is listed on the hydric soils list of Texas, the Spurger component, which makes up 85% of this soil series, is not listed on the hydric soils list of Texas.

The survey revealed that the soil in the Site was characterized as sandy clay loam mixed at the surface with caliche rock that was approximately one inch in diameter. The soil was yellowish-brown (10YR 5/6) matrix, and had a yellowish red mottle (5YR 4/6) that was approximately two millimeters in size and in very low abundance, (less than two percent). The soil was highly disturbed and appeared to be a type of fill soil from the previous development within the Site. **The soil identified was not consistent with soils typically associated with wetland areas in the region due to the lack of low chroma colors.**

## *Hydrology*

Geography and topography are primary factors influencing wetland hydrology. General topography within the survey area is relatively flat land, which gradually slopes down from the north towards the south end of the Site, as seen in Figure 3-2. Review of the NWI Maps (Figure 3-3) did not indicate the presence of NWI-mapped wetlands in the survey area; however, NWI mapped wetlands are indicated approximately 50 feet south of the Site. FEMA 100-year flood plain maps indicated that the survey area is located within the 100-year flood plain (Figure 3-4). The southern half of the survey area has been classified as having high risk, at least one percent, of flooding annually, whereas the northern half of the survey area is classified as having moderate to low risk, meaning a less than one percent chance of flooding annually.

### 3.2

#### **SWALE**

One swale feature (SAHA001, Figure 2-1) was identified within the Site. This feature is located near the eastern portion of the Site, and is described as a swale, or a shallow trough-like depression that carries water mainly during rainstorms. The swale appears to be caused by the installation of a culvert, within the past 5 years, located under Burge Road by an adjacent landowner. No erosional features or swales were previously recorded on the Site prior to the installation of the culvert. North of the Site is an agricultural development with a separate ephemeral swale that drains from the agricultural property through a culvert and into the swale on the Site. The swale on the Site drains to the mixed bottomland hardwood-cypress forest and NWI-mapped wetland to the south of the Site.

This feature is approximately 0.43 acres in size and runs north and south across the Site. At the time of the survey, approximately two inches of clear standing water was present in portions of the swale. During the three days prior to the field survey, the area received 2.21 inches of rainfall. Approximately 93% of that precipitation fell on the day directly before the survey. Annually, the area receives 57.3 inches of rainfall. The precipitation received the day prior to the survey was nearly half the monthly November average of 4.68 inches. This localized and recent precipitation led to saturation of the soil, and consequently less absorption capabilities than would be present under normal circumstances.

The swale is located within approximately 1,250 feet north of the LNVA canal, a RPW. The LNVA canal functions to pull fresh water from the Neches River down to the City of Beaumont. The nearest TNWs are the Pine Island Bayou (approximately 0.20 miles away) and the Neches River (approximately 1.6 miles away). The LNVA canal has no direct connection to Pine Island Bayou. **No direct connection could be identified between SAHA001 and Pine Island Bayou or the Neches River.**

As mentioned above, SAHA001 is fed by an apparent ephemeral swale that drains from the agricultural property north of the Site, through a culvert, and into the swale. The swale drains south of the Site into an observed mixed bottomland hardwood-cypress forest. A direct connection between the swale and an observed wetland located south of the Site was observed during the field survey. ERM did not delineate or verify the extent of the observed wetland south of the Site. However, through the use of NWI and topographic mapping, it was determined that the wetland south of the Site is adjacent to the LNVA canal. Accordingly, a minor, indirect connection could exist between the Site swale and the LNVA canal, but only immediately following rain events (during which the Site swale collects storm water from the surrounding uplands).

### 3.3 *UPLANDS*

Upland habitat associated with the Site consisted of various grass species, rough dropseed, and young (less than five years old) loblolly pine trees. The Site could predominantly be classified as abandoned industrial lands as, to a large extent, the Site is still covered by caliche rock, gravel and other stabilizing materials, including several concreted areas left over from previous oil and gas exploration activities. The Site is also surrounded by some residential developments, active agricultural pasture land and forested upland areas.

**SUMMARY AND CONCLUSIONS**

ERM completed a wetland delineation for Endeavor on November 13, 2008, in support of the Project. The wetland delineation was performed within the approximately two-acre fenced Site in order to detect the presence of USACE jurisdictional wetlands and waterbodies that, if present, could potentially be impacted by Project activities.

Habitat associated with the Site was characterized using field observations, interpretation of aerial mapping, and USGS 7.5-minute topographic maps and consisted of various grass species and young loblolly pine trees.

**No areas were identified within the survey area that met the three parameters (vegetation, soils, and hydrology) of a wetland.**

One swale (SAHA001), was identified within the eastern portion of the survey area. The swale drains south of the Site into an adjacent mixed bottomland hardwood-cypress forest. The mixed bottomland hardwood-cypress forest, a NWI-mapped feature, abuts the LNVA canal, a RPW, approximately 1,250 feet south of the Site.

An insignificant indirect connection could exist between the swale and the LNVA canal, but only immediately following rain events (during which the swale collects storm water from the surrounding uplands). No indirect or direct connection was identified between the swale and a TNW. Therefore, ERM suggests that the swale should not fall under the jurisdiction of the CWA and the USACE. However, ERM recommends that this opinion be verified with the USACE, as only the USACE and the EPA can make that final determination. If the USACE concurs that the swale is not a jurisdictional feature, no permitting is required in relation to wetland/waterbody impacts. If, instead, the swale is determined to be a "water of the U.S.", ERM recommends that Project-related impacts to this feature be permitted under Nationwide Permit (NWP) 43. This permit authorizes activities involving construction or maintenance of storm water management facilities. Construction of new facilities would also require submittal of a Pre-Construction Notification to the USACE.

## 5.0 REFERENCES

### 5.1 ENVIRONMENTAL INVESTIGATORS

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Weizer, Julie M. Environmental Resources Management, Associate Scientist

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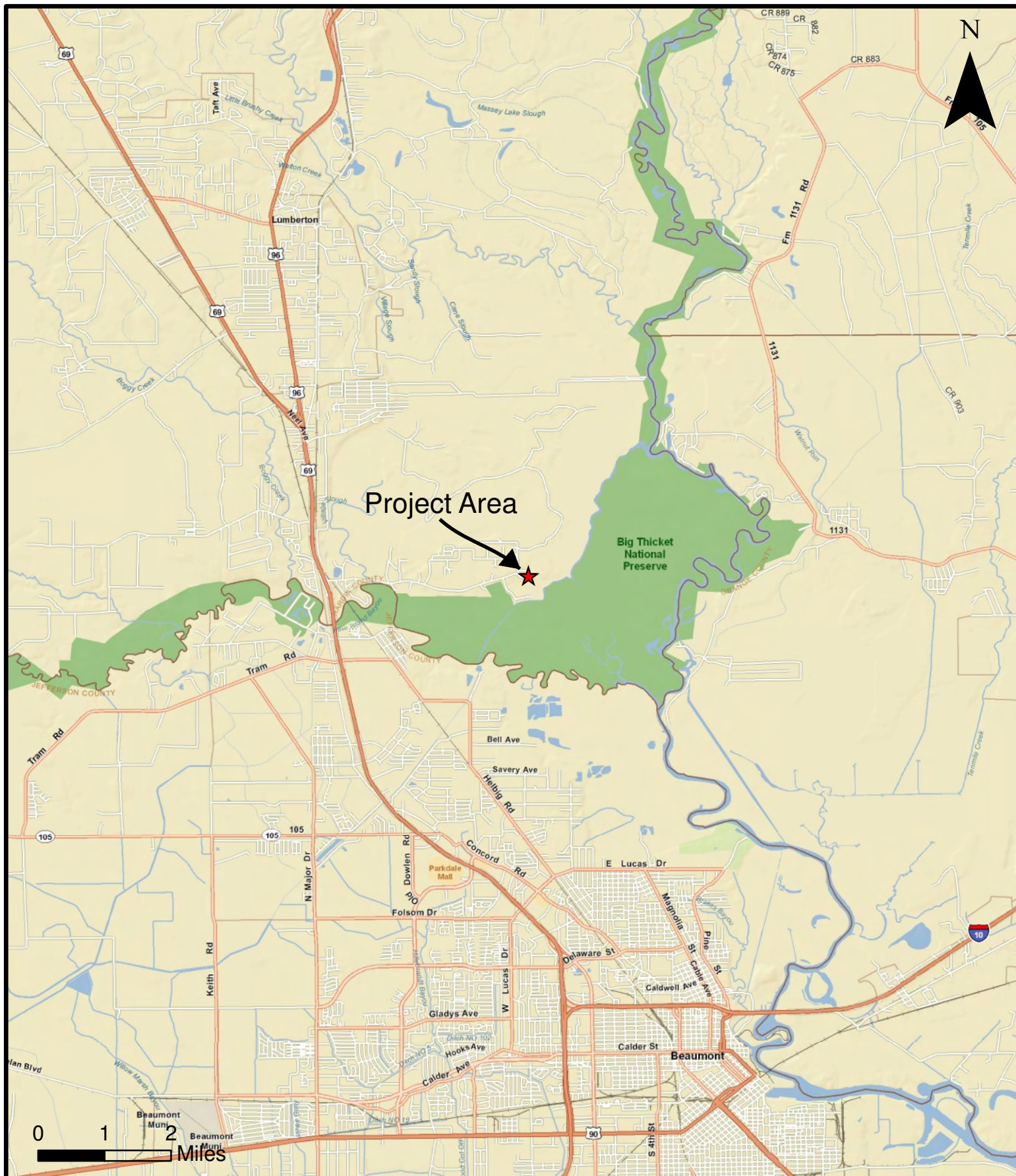
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## **Figures**

*May 28, 2009*  
*Project No. 0092408*

**Environmental Resources Management Southwest Inc.**  
15810 Park Ten Place, Suite 300  
Houston, Texas 77084-5140  
(281) 600-1000





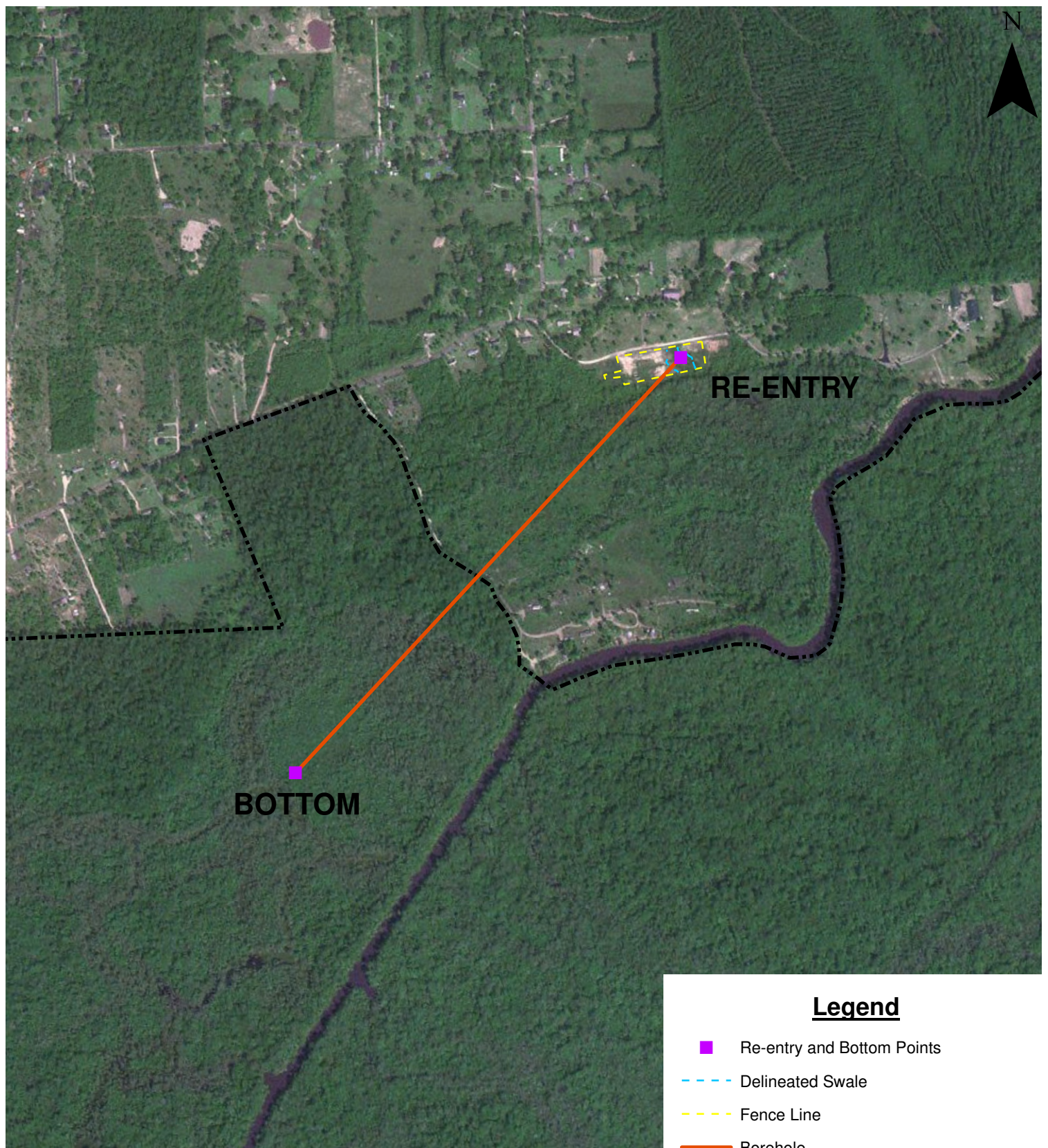
## Environmental Resources Management

DESIGN: E. Anitsakis	DRAWN: S. King	CHKD.: A. Smith
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FIGURE 1-1  
VICINITY MAP  
Blackstone Minerals B-2 Re-entry  
Endeavor Natural Gas LP  
Hardin County, Texas







0 800 1,600  
Feet

### Legend

- Re-entry and Bottom Points
- Delineated Swale
- Fence Line
- Borehole
- Big Thicket National Preserve Boundary

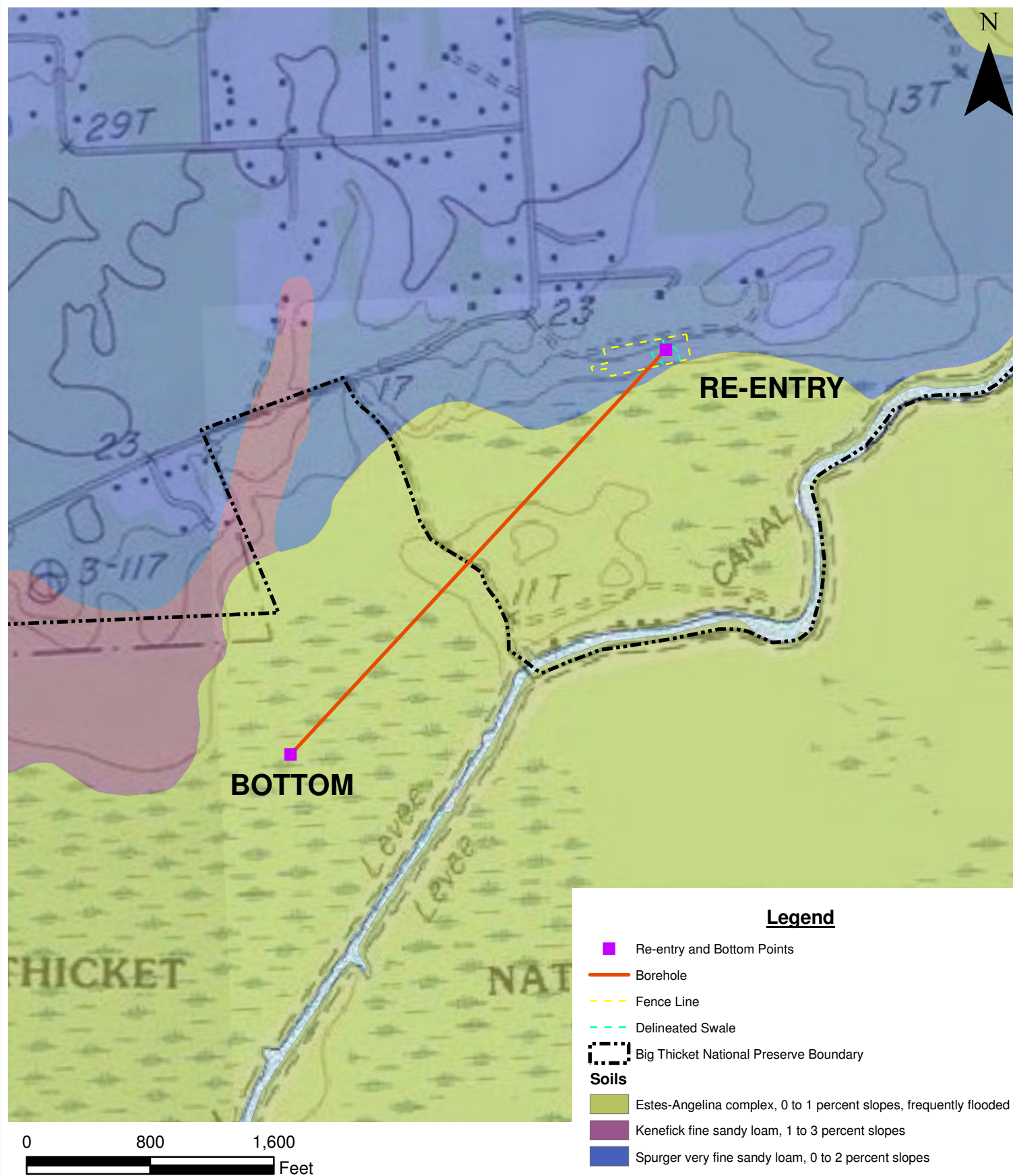
## Environmental Resources Management

DESIGN: E. Anitsakis	DRAWN: S. King	CHKD.: A. Smith
DATE: 12/03/08	SCALE: AS SHOWN	REVISION: 0
File: I:\Endeavor\GIS\projects\airial.mxd		

FIGURE 2-1  
AERIAL MAP  
Blackstone Minerals B-2 Re-entry  
Endeavor Natural Gas LP  
Hardin County, Texas







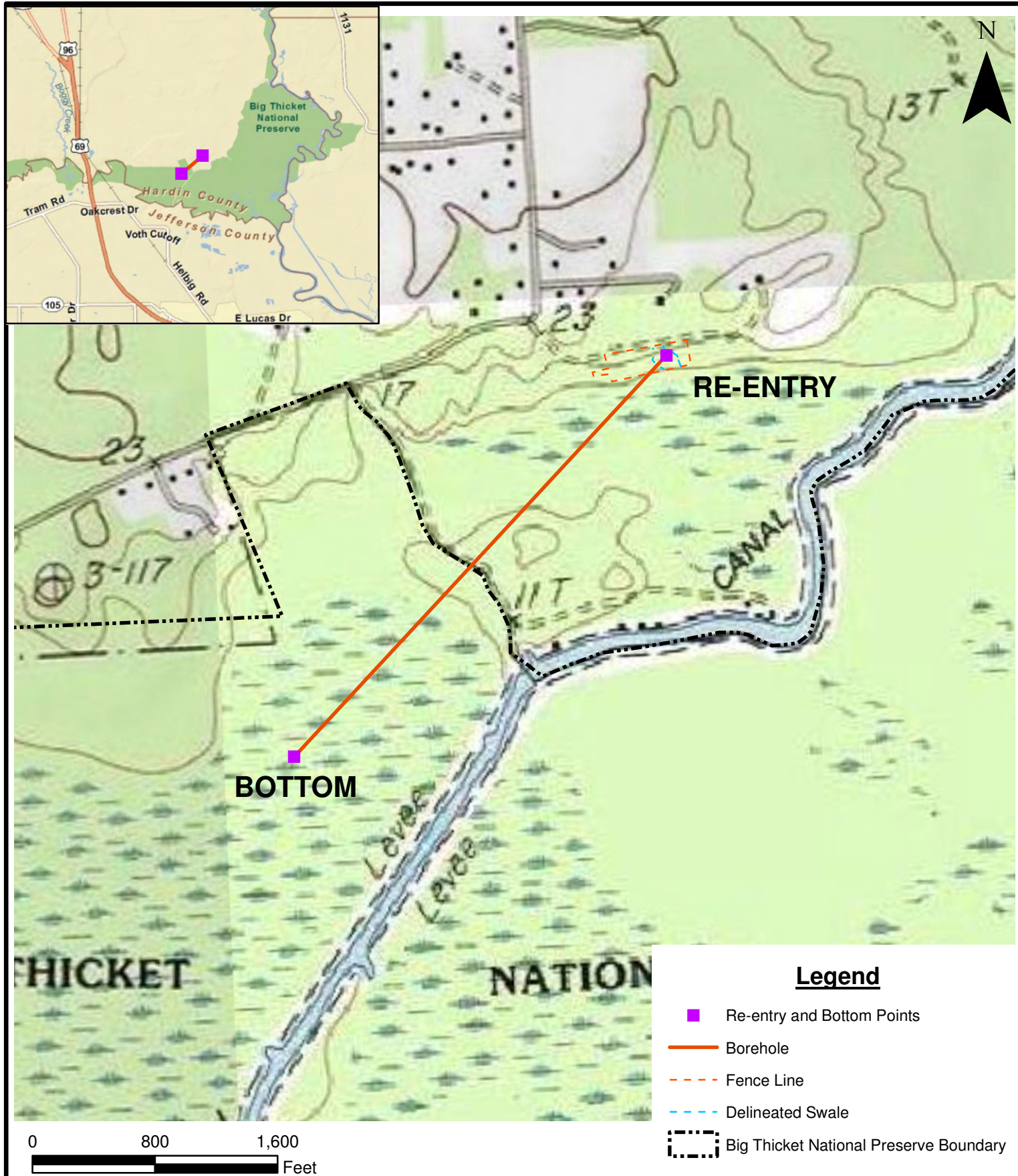
## Environmental Resources Management

DESIGN: E. Anitsakis	DRAWN: S. King	CHKD.: A. Smith
DATE: 12/03/08	SCALE: AS SHOWN	REVISION: 0
File: I:\Endeavor\GIS\projects\soils.mxd		

**FIGURE 3-1**  
**SOILS MAP**  
 Blackstone Minerals B-2 Re-entry  
 Endeavor Natural Gas LP  
 Hardin County, Texas







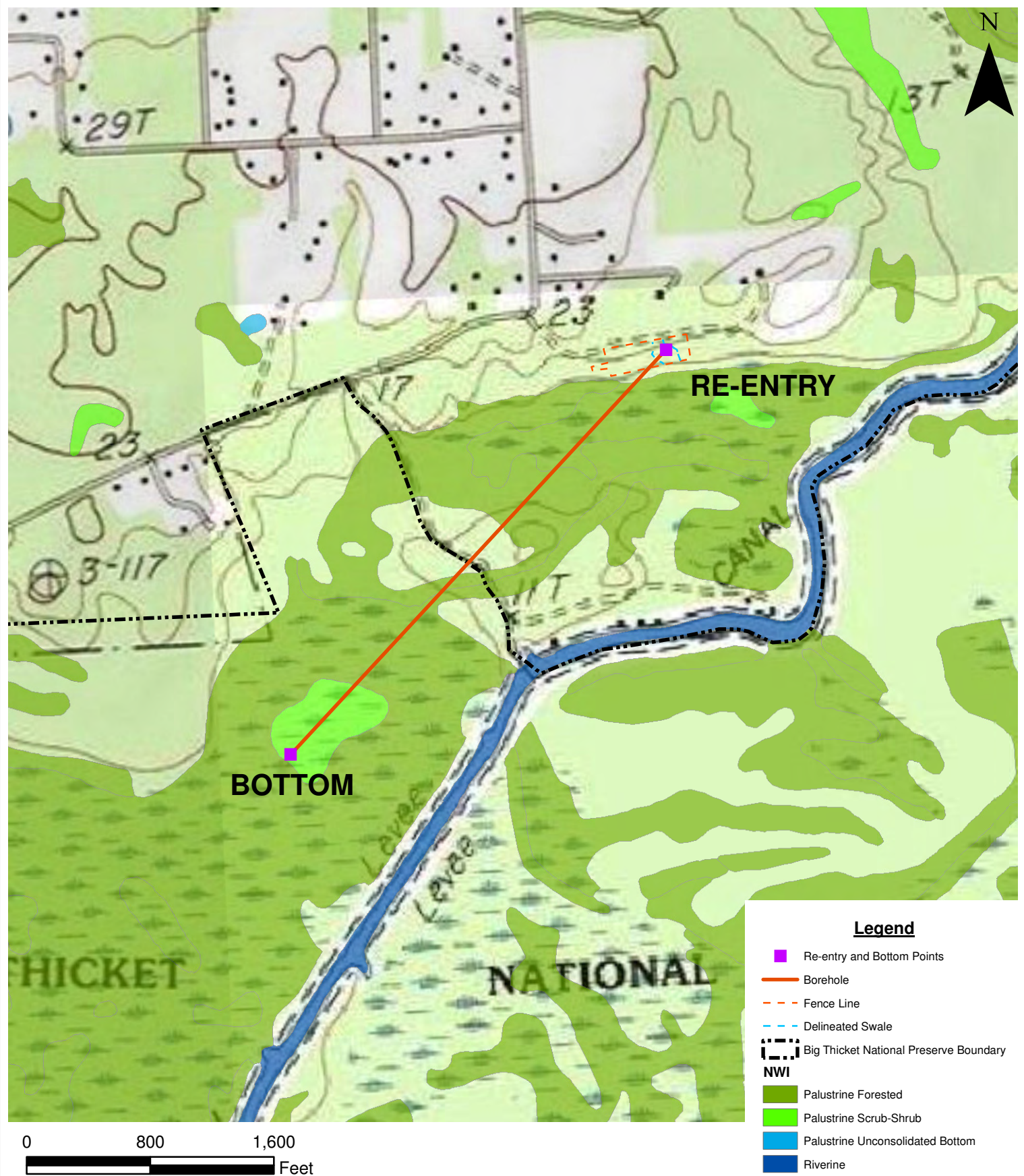
## Environmental Resources Management

DESIGN: E. Anitsakis	DRAWN: S. King	CHKD.: A. Smith
DATE: 12/03/08	SCALE: AS SHOWN	REVISION: 0
File: I:\Endeavor\GIS\projects\topo.mxd		

**FIGURE 3-2**  
**TOPOGRAPHIC MAP**  
 Blackstone Minerals B-2 Re-entry  
 Endeavor Natural Gas LP  
 Hardin County, Texas







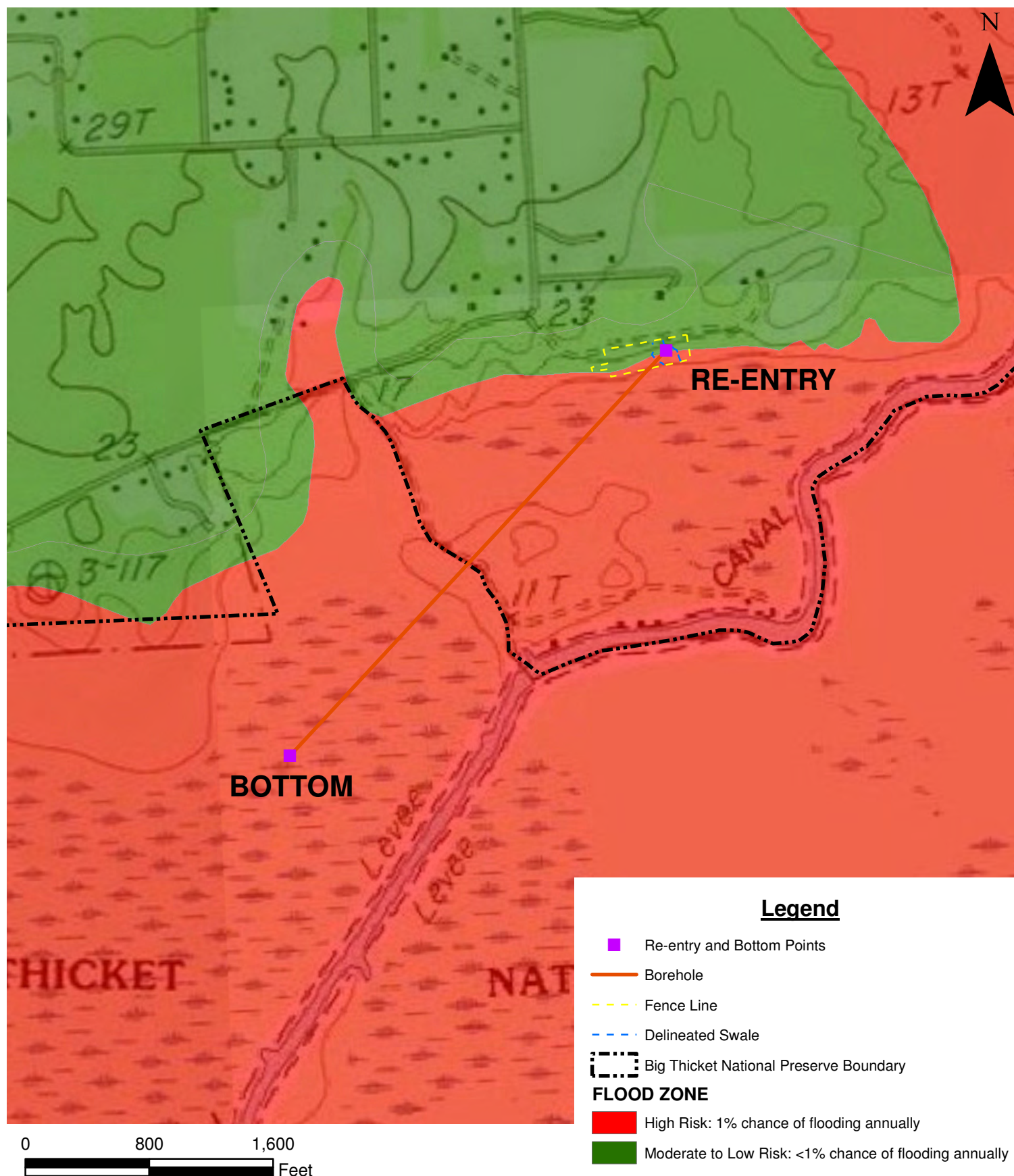
## Environmental Resources Management

DESIGN: E. Anitsakis	DRAWN: S. King	CHKD.: A. Smith
DATE: 12/03/08	SCALE: AS SHOWN	REVISION: 0
File: I:\Endeavor\GIS\projects\NWI.mxd		

FIGURE 3-3  
NWI MAP  
Blackstone Minerals B-2 Re-entry  
Endeavor Natural Gas LP  
Hardin County, Texas







## Environmental Resources Management

DESIGN: E. Anitsakis	DRAWN: S. King	CHKD.: A. Smith
DATE: 12/03/08	SCALE: AS SHOWN	REVISION: 0
File: I:\Endeavor\GIS\projects\flood.mxd		

**FIGURE 3-4**  
**FLOODPLAIN MAP**  
 Blackstone Minerals B-2 Re-entry  
 Endeavor Natural Gas LP  
 Hardin County, Texas

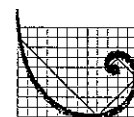


**Field Data Sheets**  
*Appendix A*

*May 28, 2009*  
*Project No. 0092408*

**Environmental Resources Management Southwest, Inc.**  
15810 Park Ten Place, Suite 300  
Houston, Texas 77084-5140  
(281) 600-1000

# WATERBODY DATA SHEET



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Waterbody Name: N/A

Waterbody ID No.: SAHA001

Centerline Re-Route Access Road Warehouse Site Other: Well Pad Site

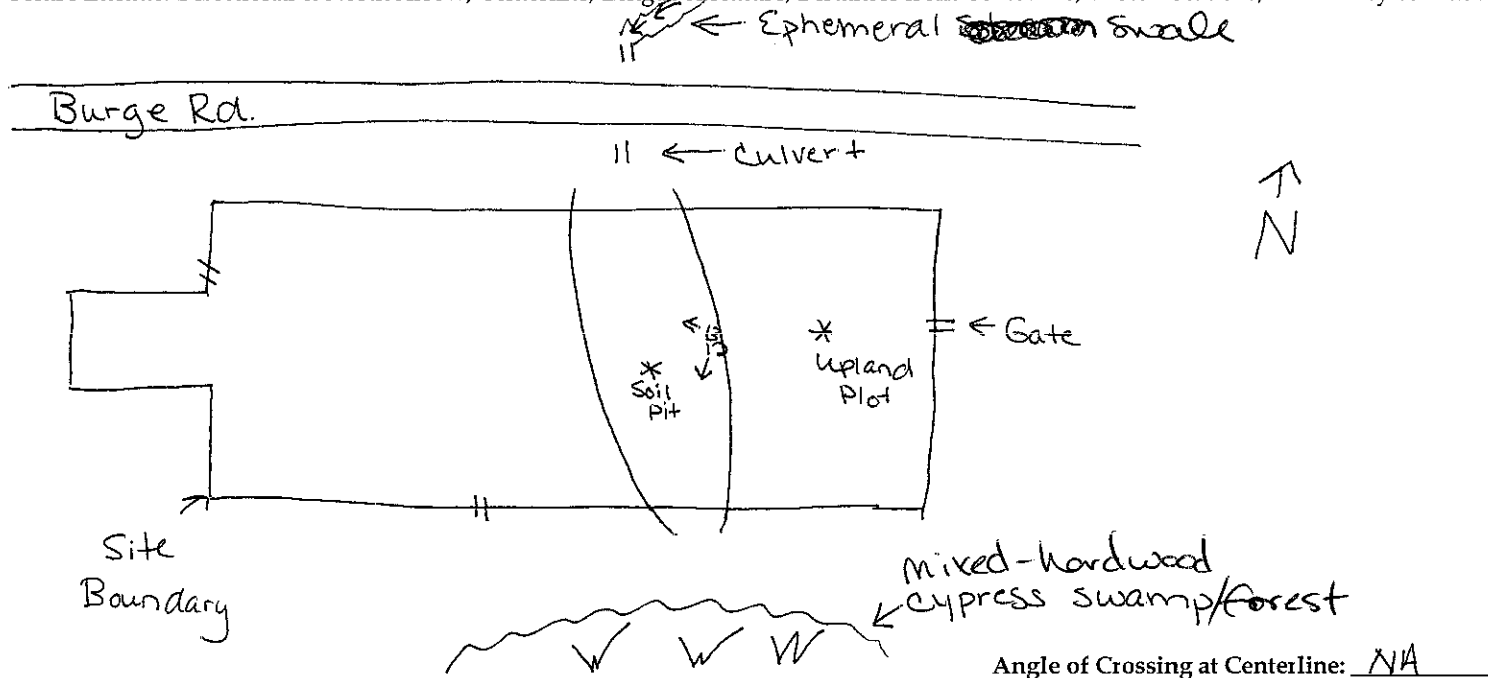
Associated Wetland No.: N/A

Date: <u>11/13/08</u>	Client/Project Name & No.: <u>Endeavor</u>	Milepost: <u>NA</u>
Investigators: <u>K McMahon &amp; J. Weizer</u>		Quad Name:
State/County/Municipality: <u>Texas / Hardin Co.</u>		Picture No.: <u>12SW, 13NW</u>

## PHYSICAL ATTRIBUTES

### Waterbody Sketch Plan

Please include: Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor



Waterbody Type	Lake	Pond	Borrow Pit	River	Stream	Ag. Ditch	Other: <u>Swale</u>
Stream Flow	Fast	Moderate	Slow				<u>Very Slow</u> None
Flow type	Perennial (Flows > 3 months annually)	Intermittent/Seasonal (Flows < 3 months annually)	Ephemeral (Flows only in response to rainfall)		Direction: <u>South</u> Months of estimated flow: <u>&lt; 3mth</u>		
OHWM Indicator	Clear natural line on bank		Shelving	Wrested vegetation	Scour	Water Staining	
Bent, matted or missing vegetation	Soil character changes		Abrupt plant community change		Wrack line	Litter and debris	
Sinuosity	<u>Straight</u>	Meandering	Subsurface Flow?		Yes	No	<u>Unknown</u>
Stream Depth (in.)	<u>0-3</u>	3-6	6-12	12-18	18-24	24-36	36-48 48-60 60+
Stream Width (ft.)	Top of Bank (at crossing location): <u>20 ft</u>				Water Surface (at crossing location): <u>&gt; 10 ft</u>		
Bank Height (ft.) (looking downstream else give direction you are facing here: <u>NA</u> )	Left	<u>0-2</u>	2-4	4-6	6-8	8+	
	Right	<u>0-2</u>	2-4	4-6	6-8	8+	
Bank Slope (°) (looking downstream else give direction you are facing here: <u>NA</u> )	Left	<u>0-20</u>	20-40	40-60	60-80	80+	
	Right	<u>0-20</u>	20-40	40-60	60-80	80+	





Waterbody ID No.: SAHA001

Date: 11/13/08 Client/Project Name &amp; No.: Endeavor Milepost: NA

## QUALITATIVE ATTRIBUTES

Water Appearance	Clear	Slightly Turbid	Turbid	Very Turbid	Color: light Brown
	Floating algal mats	Obvious surface scum	Sheen on surface	Greenish color	Other:
Stream Substrate %	Bedrock	Gravel 20%	Sand 60%	Silt/Clay 20%	Organic
Aquatic Habitats	Sand Bar	Gravel Bar	Mud Bar	Gravel Riffles	Deep Pools
Undercut Banks	Overhanging trees/shrubs	In-stream emergent plants % Cover 70%	In-stream submerged plants % Cover NA	Bank root systems	Fringing Wetlands
Aquatic Organisms Observed None	Waterfowl	Fish (adult)	Fish (juvenile)	Frogs	Turtles
	Snakes	Other:			
	Invertebrates:	Intolerant	Facultative	Tolerant	None
Riparian Zone	Width of natural vegetation zone from edge of active channel out onto flood plain: 0 (ft) Circle vegetative layers: trees shrubs herbs <input type="checkbox"/> Significant bare areas within riparian zone <input type="checkbox"/> Evidence of non-buffered concentrated flows				
Tributary is	Natural	Artificial (Man-Made)	Manipulated (Explain below)		Stable / Unstable
Channel Condition	Channelization/Braiding	Unnatural straightening	Downcutting	Dikes/Berms	Excessive bank erosion
Disturbances	<input type="checkbox"/> Livestock access to riparian zone		<input type="checkbox"/> Manure in stream or on banks		
	<input type="checkbox"/> Waste discharge pipes present		<input type="checkbox"/> Other:		

## T/E SPECIES / SUITABLE HABITAT

Habitat ID No:

None Observed

## Comments (e.g. Information useful for JD forms, construction constraints, erosion potential, existing disturbances, and meanders)

This swale is located in an area that was previously used for Drilling activities. The soils in the area are sandy loams w/ 72% gravel, some areas have large gravel (approx 1 in diameter). Stream flows into large wetland to

## STREAM QUALITY (indicate)

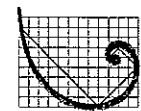
☐ High☐ Moderate☒ Low

South of the site.

**High Quality:** Natural channel (no structures or dikes; no evidence of downcutting or excessive lateral cutting); evidence of past channel alteration with significant recovery; any dikes/levees are set back to provide access to adequate flood plain; natural vegetation extends at least one or two active channel widths on each side; banks stable and protected by roots that extend to the base-flow elevation; water clear to tea-colored; no barriers to fish movement (seasonal water withdrawals prevent movement); many fish cover types available; diverse and stable aquatic habitat; no disturbance by livestock or man; intolerant macroinvertebrates present

**Moderate Quality:** Altered channel evidenced by rip rap and/or channelization; dikes/levees restrict flood plain width; natural vegetation extends 1/3-1/2 of the active channel width on each side; filtering function of riparian vegetation only moderately compromised; banks moderately unstable (outside bends actively eroding with few fallen trees); considerable water cloudiness, submerged objects covered with green film; moderate odor; minor barriers to fish movement; 4-3 fish cover types available; fair aquatic habitat; minimum disturbance by livestock or man; Facultative macroinvertebrates present

**Low Quality:** Channel is actively downcutting or widening; rip rap and channelization excessive; flood plain restricted by dikes/levees; natural vegetation less than 1/3 of the active channel width on each side; lack of regeneration; filtering function severely compromised; Banks unstable (inside and outside bends actively eroding with numerous fallen trees); water very turbid to muddy; obvious pollutants (algal mats, surface scum, surface sheen); heavy odor; green color to water; severe barriers to fish movement; 2-0 fish cover types available; little to no aquatic habitat; severe disturbance by livestock or man; tolerant or no macroinvertebrates present



ERM®

WETLAND DELINEATION DATA FORM  
(1987 COE METHODOLOGY)

Centerline Re-Route Access Road Pump Station Other: Well Pad Site

Wetland ID #: WAHA001 U  
Associated Stream ID #: NA

Date: <u>11/13/08</u>	Client/Project Name & No.: <u>Endeavor</u>	Milepost: <u>    </u>
Investigators: <u>K. McMahon &amp; J. Weizer</u>		Quad Name: <u>    </u>
State/County/Municipality: <u>TX / Hardin Co.</u>		Picture No.: <u>2N</u>

Normal Circumstances? <u>No</u>	Significantly Disturbed: <u>Yes</u>	Potential Problem Area? <u>No</u>
Wetland Type (circle one): PFO PEM PSS Other: <u>Upland</u>		

DOMINANT PLANT SPECIES				Stratum	Indicator	%	NON-DOMINANT PLANT SPECIES				Stratum	Indicator	%
1.	<u>Pinus taeda</u>			<u>T</u>	<u>FAC-</u>	<u>72</u>	1.						
2.	<u>Sporobolus asper</u>			<u>H</u>	<u>FACU-</u>	<u>43</u>	2.						
3.							3.						
4.							4.						
5.							5.						
6.							6.						
7.							7.						
8.							8.						
9.							9.						

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-):

Hydric Vegetation Criteria Met? (circle one) Yes No

Wetland Quality 1: High Moderate Low Explain:

Remarks: Upland Area

HYDROLOGY

Wetland supports riparian buffer? Yes No If yes, describe (with, cover type, etc.):

Depth of Surface Water:      (in.) Depth to Saturated Soil:      (in.)

Color of Surface Water:      (if applicable) Depth to Free Water in Pit:      (in.)

Surface Water Appearance (circle those that apply): Obvious surface scum Sheen on surface Greenish color Other:

Primary Wetland Indicators (circle those that apply):

Inundated  
Saturated in Upper 12 Inches  
Drift Lines  
Sediment Deposits  
Water Marks  
Drainage Patterns in Wetlands

Secondary Wetland Indicators (2 or more required) (circle those that apply):

Oxidized Root Channels in Upper 12  
Water-Stained Leaves  
Local Soil Survey Data  
FAC-Neutral Test  
Other (Explain in Remarks)

Remarks: Upland Area

SOILS

Map Unit Name (Series and Phase): Drainage Class:

Taxonomy (Subgroup): Field Observations Confirm Mapped Type?

Profile Description:

Depth (Inches)	Horizon	Matrix Color (Munsell Moist)	Mottle (Abundance/Contrast)	Texture, Concretions, Structure, etc
<u>0-2</u>	<u>-</u>	<u>10YR 5/6</u>	<u>5YR 4/6; 72%</u>	<u>Sandy Clay, 72% gravel</u>

Circle those that Apply:

Histosol Sulfidic Odor Organic Streaking in Sandy Soils Oxidized Rhizospheres Concretions  
Histic Epipedon Aquic Moisture Regime Organic Pans in Sandy Soils Listed on Local Hydric Soils List  
High Organic Content Gleyed or Low Chroma Colors Other:

**WETLAND DETERMINATION**

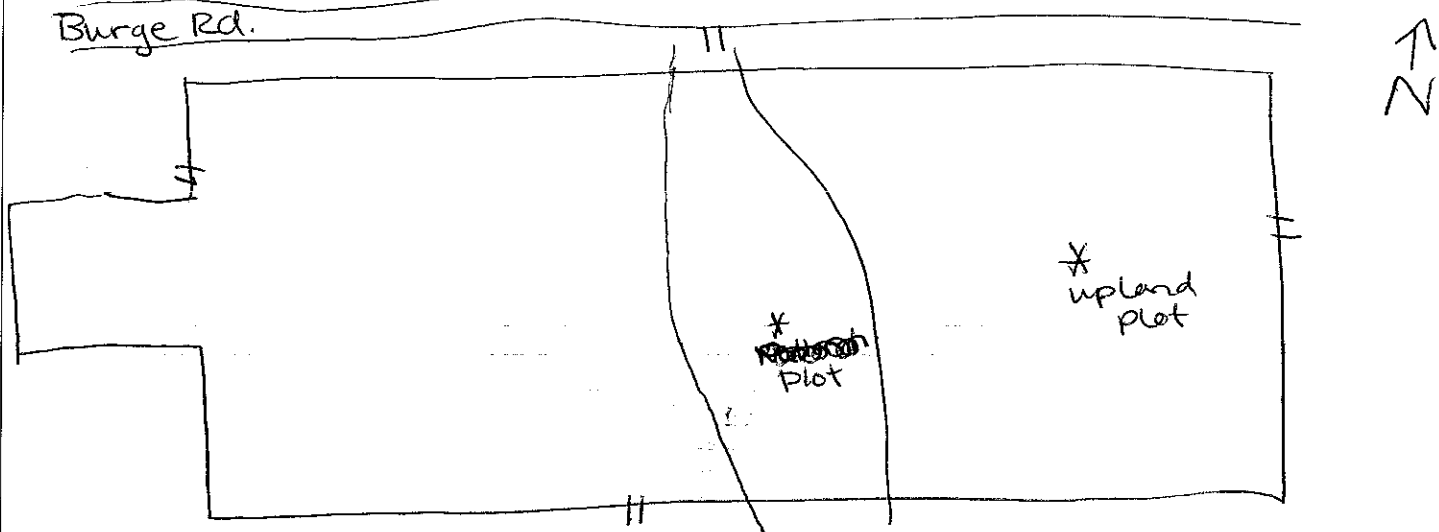
Hydrophytic Vegetation Present?	Yes	<u>No</u>	Is This Sampling Point Within a Wetland?	Yes	<u>No</u>
Wetland Hydrology Present?	Yes	<u>No</u>	Is This An Isolated Wetland?	Yes	<u>No</u>
Hydric Soils Present?	Yes	<u>No</u>	Is Wetland <u>Adjacent</u> <sup>2</sup> or <u>Abutting</u> <sup>2</sup> Associated Stream? If yes, Circle and explain.		
If not abutting a stream, is there a surface connection between this wetland and a stream? Yes No Waterbody ID No.: _____					
Flow between Wetland and Stream is:			Perennial	Intermittent	Ephemeral
			No Flow	Subsurface Flow?	
Surface flow between Wetland and Stream is:			Discrete <sup>3</sup>	Confined <sup>3</sup>	Discrete and Confined <sup>3</sup>
			Overland Sheet-flow	No Flow	
Direction of Surface flow between Wetland and Stream is:			No Flow	From Wetland to Waterbody	From Waterbody to Wetland
			Both To/From		
Other connection with Stream?			Ecological (explain)	None	Separated by berm or barrier?
				Yes	No

Remarks:

Upland Area

**DRAWING**

Please include: Directional &amp; North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor



Describe Habitat Characteristics, Aquatic &amp; Terrestrial Diversity, or :

Description of Wetland and General Comments (i.e., angle at pipeline crossing, construction constraints, erosion potential, existing disturbances, and meanders):

Upland Area at an Abandoned well pad site.

Description of Wetland Quality Criteria and Adjacency



<sup>1</sup> **HIGH QUALITY WETLAND:** no indication of stress or disturbance in wetland or adjacent area – diverse and mature vegetation types – hydrologic and soil indicators are characteristic of the specific community type – provides suitable habitat for wildlife – high quality perennial streams are often observed<sup>1</sup> **MODERATE QUALITY WETLAND:** mild to moderate disturbances have caused alterations in immediately adjacent areas – slightly altered natural vegetation, hydrology and/ or soil characteristics – provides suitable habitat for wildlife and vegetation – associated perennial or intermittent streams are of relatively good quality and aren't significantly disturbed<sup>1</sup> **LOW QUALITY WETLAND:** severe disturbances have caused significant changes to vegetation, soils, or hydrology – hydroperiod alterations, if present, have directly affected plant species – community composition has changed – noticeable stress or death of plant species – soil subsidence may have occurred in areas with decreased hydroperiod – mechanical alteration of plant species or soils – grazing from livestock – channelization of stream courses or ditching – little suitable habitat for wildlife and vegetation – associated perennial or intermittent streams significantly disturbed<sup>2</sup> **ADJACENT:** near or close to but not necessarily touching<sup>2</sup> **ABUTTING:** having a common boundary or edge; touching<sup>3</sup> **DISCRETE:** Consisting of unconnected distinct parts<sup>3</sup> **CONFINED:** restricted or restrained by natural or artificial means

**Photographic Log**  
*Appendix B*

*May 28, 2009*  
*Project No. 0092408*



**Environmental Resources Management Southwest, Inc.**  
15810 Park Ten Place, Suite 300  
Houston, Texas 77084-5140  
(281) 600-1000

### Photographic Log

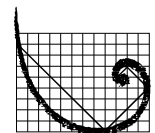
<b>Client:</b>	<b>Endeavor</b>	<b>Project Number:</b>	<b>0092408</b>
<b>Project Name:</b>	<b>B-2 Well Re-entry</b>	<b>Location:</b>	<b>Hardin County, Texas</b>
<b>Photograph ID:</b> PB130001			
<b>Feature:</b> Upland Site			
<b>Date:</b> 11/13/2008			
<b>Comments:</b> Northeast corner of the fence surrounding the Site. Photo taken facing south into Site.			
<b>Photograph ID:</b> PB130002			
<b>Feature:</b> Upland Site			
<b>Date:</b> 11/13/2008			
<b>Comments:</b> Photo taken from the southeast corner of the Site facing north into the Site.			



# PHOTOGRAPHIC LOG



<b>Client:</b>	Endeavor	<b>Project Number:</b>	0092408
<b>Project Name:</b>	B-2 Well Re-entry	<b>Location:</b>	Hardin County, Texas
<b>Photograph ID:</b> PB130003			
<b>Feature:</b> Stake 1			
<b>Date:</b> 11/13/2008			
<b>Comments:</b> Picture of a knocked over stake within the Site. Stake has "ABND B-2 WELL" written on it.			
<b>Photograph ID:</b> PB130004			
<b>Feature:</b> Upland Site			
<b>Date:</b> 11/13/2008			
<b>Comments:</b> Photo showing the general condition of the Site. Photo taken facing southwest.			



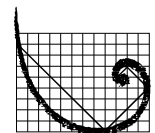


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## PHOTOGRAPHIC LOG



<b>Client:</b>	Endeavor	<b>Project Number:</b>	0092408
<b>Project Name:</b>	B-2 Well Re-entry	<b>Location:</b>	Hardin County, Texas
<b>Photograph ID:</b> PB130005			
<b>Feature:</b> Upland Site			
<b>Date:</b> 11/13/2008			
<b>Comments:</b> Photo taken from the northwest corner of the Site facing southeast into the Site.			
<b>Photograph ID:</b> PB130006			
<b>Feature:</b> Upland Site			
<b>Date:</b> 11/13/2008			
<b>Comments:</b> Photo of the vegetation located to the west of the Site. Photo taken facing northwest outside of the Site to the adjacent habitat.			



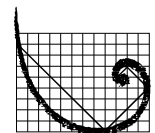


**ERM**®

## PHOTOGRAPHIC LOG



<b>Client:</b>	Endeavor	<b>Project Number:</b>	0092408
<b>Project Name:</b>	B-2 Well Re-entry	<b>Location:</b>	Hardin County, Texas
<b>Photograph ID:</b> PB130007			
<b>Feature:</b> Upland Site			
<b>Date:</b> 11/13/2008			
<b>Comments:</b> Photo of the vegetation located to the western portion of the Site. Photo taken facing southwest outside of the Site to adjacent habitat.			
<b>Photograph ID:</b> PB130008			
<b>Feature:</b> Upland Site			
<b>Date:</b> 11/13/2008			
<b>Comments:</b> Photo of the southwest corner of the Site. Photo taken facing northeast into the Site.			







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## PHOTOGRAPHIC LOG

<b>Client:</b>	Endeavor	<b>Project Number:</b>	0092408
<b>Project Name:</b>	B-2 Well Re-entry	<b>Location:</b>	Hardin County, Texas
<b>Photograph ID:</b> PB130009			
<b>Feature:</b> Adjacent Area			
<b>Date:</b> 11/13/2008			
<b>Comments:</b> Photo of the vegetation located south of the Site. Photo taken facing south towards the adjacent habitat outside Site.			
<b>Photograph ID:</b> PB130010			
<b>Feature:</b> Stake 2			
<b>Date:</b> 11/13/2008			
<b>Comments:</b> Photo of a stake located south of the center of the Site. Stake has "D-1 WELL Abandoned" written on it.			





## PHOTOGRAPHIC LOG

<b>Client:</b>	Endeavor	<b>Project Number:</b>	0092408
<b>Project Name:</b>	B-2 Well Re-entry	<b>Location:</b>	Hardin County, Texas
<b>Photograph ID:</b> PB130011			
<b>Feature:</b> Stake 2			
<b>Date:</b> 11/13/2008			
<b>Comments:</b> Photo of D-1 Well stake. Photo taken facing south.			
<b>Photograph ID:</b> PB130012			
<b>Feature:</b> SAHA001			
<b>Date:</b> 11/13/2008			
<b>Comments:</b> Photo showing water flowing from the swale SAHA001 in the Site into a large mixed bottomland hardwood-cypress forest located to the south of the Site. Photo taken facing south outside of site.			





## PHOTOGRAPHIC LOG

<b>Client:</b>	Endeavor	<b>Project Number:</b>	0092408
<b>Project Name:</b>	B-2 Well Re-entry	<b>Location:</b>	Hardin County, Texas
<b>Photograph ID:</b> PB130013			
<b>Feature:</b> SAHA001			
<b>Date:</b> 11/13/2008			
<b>Comments:</b> Photo of vegetation located inside the swale, SAHA001. Photo taken facing southwest			
<b>Photograph ID:</b> PB130014			
<b>Feature:</b> SAHA001			
<b>Date:</b> 11/13/2008			
<b>Comments:</b> Photo the swale, SAHA001. Photo taken facing northwest.			
<b>Client:</b>	Endeavor	<b>Project Number:</b>	0092408





# PHOTOGRAPHIC LOG

<b>Project Name:</b> B-2 Well Re-entry		<b>Location:</b> Hardin County, Texas	
<b>Photograph ID:</b> PB130015			
<b>Feature:</b> Soil Pit			
<b>Date:</b> 11/13/2008			
<b>Comments:</b> Photo of the soil pit dug in the swale, SAHA001.			
<b>Photograph ID:</b> PB130016			
<b>Feature:</b>			
<b>Date:</b> 11/13/2008			
<b>Comments:</b> Photo of gravel covered ground adjacent to the swale, SAHA001.			





# PHOTOGRAPHIC LOG

<b>Client:</b>	Endeavor	<b>Project Number:</b>	0092408
<b>Project Name:</b>	B-2 Well Re-entry	<b>Location:</b>	Hardin County, Texas
<b>Photograph ID:</b> PB130017			
<b>Feature:</b>			
<b>Date:</b> 11/13/2008			
<b>Comments:</b> Ephemeral swale on the property located to the north of the Site. Photo taken facing northeast across Burge Road.			
<b>Photograph ID:</b> PB130018			
<b>Feature:</b>			
<b>Date:</b> 11/13/2008			
<b>Comments:</b> Culvert carrying water under Burge Road into Site. Photo taken facing south towards site boundary.			
<b>Client:</b>	Endeavor	<b>Project Number:</b>	0092408



# PHOTOGRAPHIC LOG

<b>Project Name:</b> B-2 Well Re-entry		<b>Location:</b> Hardin County, Texas
<b>Photograph ID:</b> PB130019		
<b>Feature:</b> LNVA Canal		
<b>Date:</b> 11/13/2008		
<b>Comments:</b> LNVA Canal located 1,250 feet south of the Site. Photo taken facing southwest.		
<b>Photograph ID:</b> PB130020		
<b>Feature:</b> LNVA Canal		
<b>Date:</b> 11/13/2008		
<b>Comments:</b> LNVA Canal located 1,250 feet south of the site. Photo taken facing northwest.		