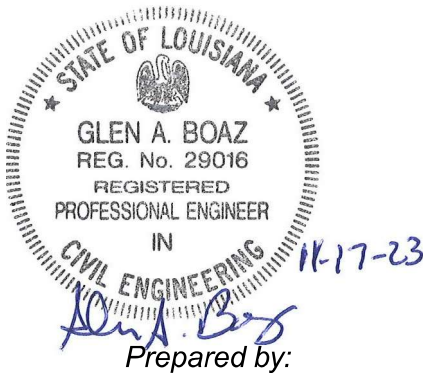


# Sulphur Brine Field Containment Levee

*Submitted by:*

**Westlake**

# Westlake



*Prepared by:*



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ReCon Engineering Project No. 23261173

November 17, 2023

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    SK-APP1-03           Containment System Plan

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    SK-APP1-05           Levee and Weir Structures

## **1.0 BACKGROUND**

Order 3.i. of the Third Supplement to Compliance Order No. IMD 2022-027 issued by the State of Louisiana Department of Natural Resources Office of Conservation requires Westlake US 2, LLC (Westlake) to submit a plan to construct a containment system around the potential affected area at the Sulphur Brine Field in the event of a surface expression caused by a failure of Cavern 7.

In response to the order, a levee containment system plan has been developed and is currently in the review process. The containment system consists of the following components:

- Engineered earthen levees constructed with low permeability compacted clay soils surrounding the possible impact site (see Figure 1). Due to area restrictions, a portion of the levee will utilize steel sheet piles with an impermeable interior liner.
- Two major weir drainage structures will allow transfer of water from one side of the containment levee to the other. Each structure will include three 36-inch diameter drainpipes that run through the levees. Each pipe will have valves which can be manually opened or closed to allow water transfer to the outside of the levee.
- A smaller single pipe weir structure is planned for the east side levee and will drain to the central pond.
- A pump station will be constructed within the containment system to also remove and/or utilize pond water. Two pumps are proposed for the station. One pump will be the primary pump and the other will act as a backup.

## **2.0 INTRODUCTION**

This Plan describes the basis of the containment system layout, drainage structures, levee elevation, materials of construction, etc.:

- Anticipated impact zone;
- Levee location;
- Current runoff receiving streams;
- Elevation of containment levee;
- Containment levee construction materials

Each of these items is addressed in greater detail in the sections that follow in this Containment System Plan

### 3.0 SITE INFORMATION

The majority of the brine field site in question is currently owned by Sulphur Dome, LLC and Westlake. Westlake leases property to mine brine that is used in the Chlor-Alkali process at the Westlake South facility. Other landowners that may be impacted by the levee construction are Brimstone History Society, Apollo Lake Charles, Bell Mineral LLC, Julia B Est. Pollock, Keith Hobgood, and LOLC LLC.

The soils at the site are identified as Guyton, Judice, and Morey by USDA Soil Survey and fall into the Hydraulic Soil Groups C or D. These soils typically have land slopes in the 0 to 1% range and rarely flood. Vegetation consists of grass, naturally growing trees, and ponds. A large portion of the containment system will surround an existing pond.

### 4.0 CONTAINMENT SYSTEM PLAN

#### 4.1 IMPACT ZONE

The impact zone was identified in the Lonquist “Surface Expression Impact Zone Estimate” document updated November 2, 2023. See Figure 4 page 6 of 41 of indicated document. The initial impact zone has been identified to have a diameter of 678 feet with the epicenter located 488 feet due west of Well 7B. The final impact zone is indicated to have a diameter of 1841 feet. Both impact zones are shown with the proposed containment levee location on Appendix 1, drawing SK-APP1-02 and SK-APP1-03.

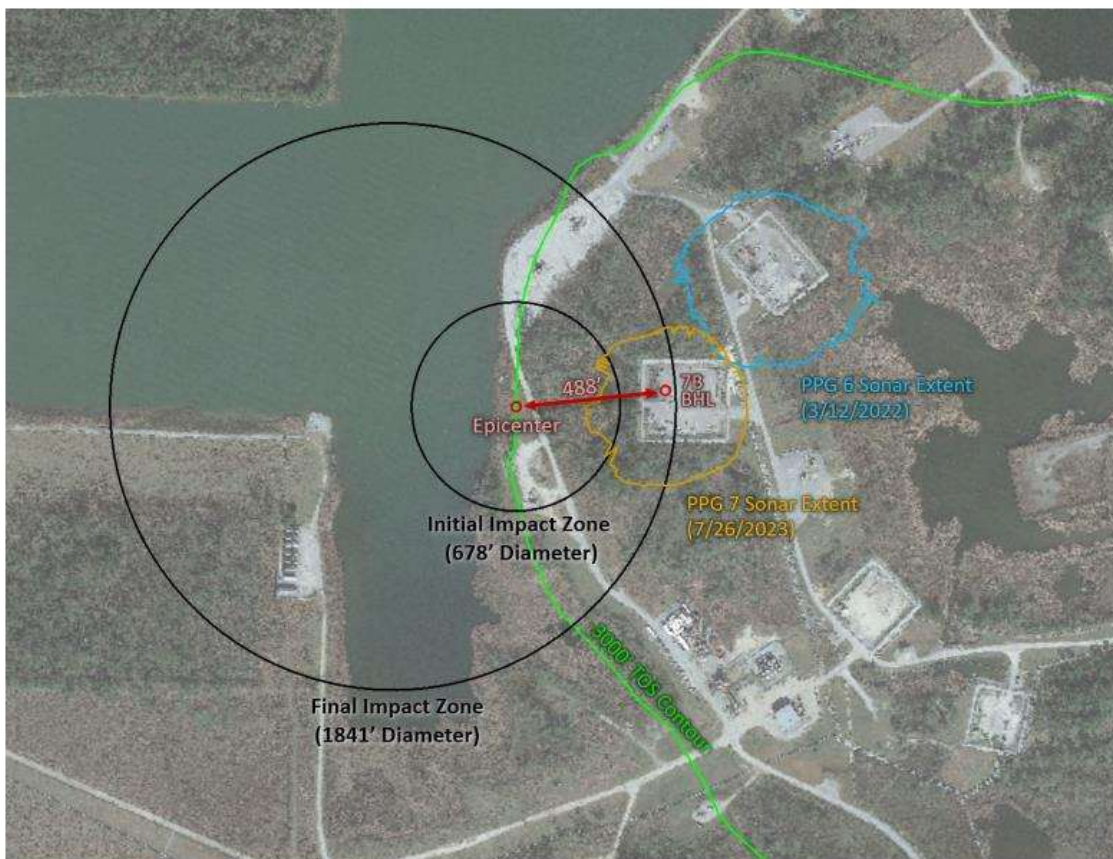


Figure 1 – Impact Zone Diagram (Obtained from Lonquist document dated 11/2/2023)

## 4.2 CONTAINMENT LEVEE LAYOUT

Using the indicated impact zones as the starting point, the containment levee was located to surround the impact zones. Because the impact zones are mostly located at a pond, the entire pond has been included within the containment levee. In addition, well location number 7B is included within the confines of the levee. See SK-APP1-02 in the appendix for levee layout.

The proposed levee layout encompasses an approximate 299 acres and the length of the levee is 18740 feet.

## 4.3 RECEIVING STREAMS

Two stormwater receiving streams have been identified at the Brine Field site as shown in Figure 2. One is a Bayou Choupique drainage lateral that is located at the very south side of the property. It receives mostly stormwater runoff that originates from the west side of the property. The other is a Bayou D'Inde drainage lateral that enters the east side of the property at about the midpoint of the facility and receives storm water from the east side of the property.

Two main drainage weir structures are planned for the Containment Pond. One structure will be located on the southwest side of the pond. This structure will discharge to the Bayou Choupique drainage lateral. The other weir structure will be located at the current drainage culvert on the west side of the pond about mid-way on the property. This culvert currently drains to the ponds located east of the Brine site and then to a Bayou D'Inde drainage ditch. The second drainage weir structure will be located at the current drainage culvert that will be removed.

A third drainage weir will be located on the east side around the wells. This drainage structure is considered minor because it will only drain locally collected runoff and discharge into the central pond.

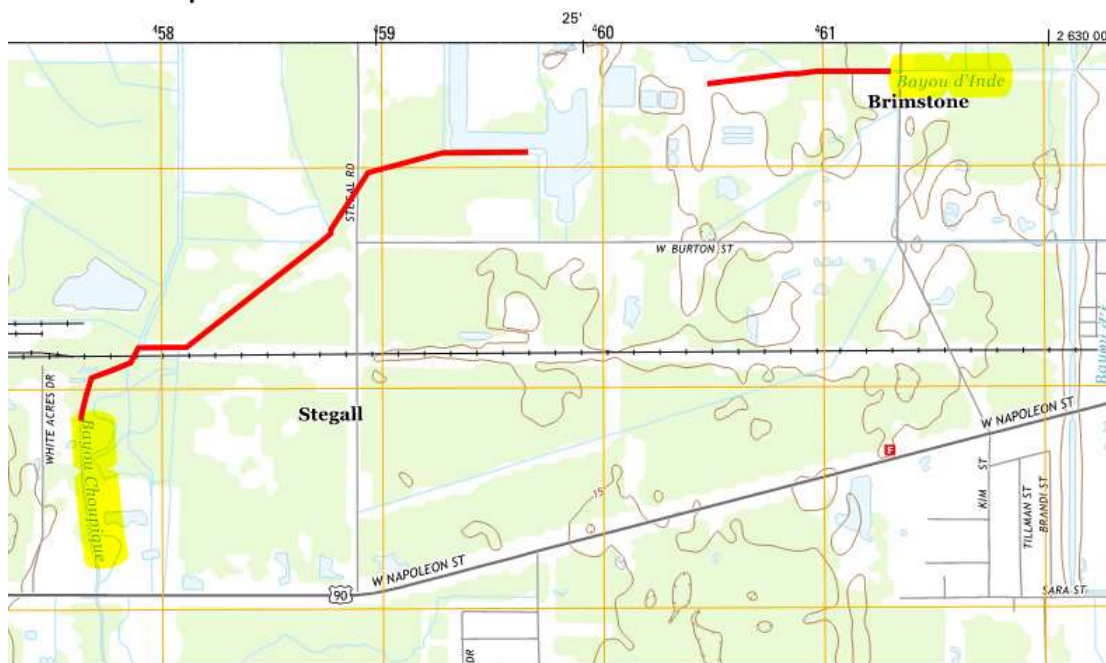


Figure 2 – Topographic Map Indicating Two Receiving Streams

## 4.4 ELEVATION OF CONTAINMENT LEVEE

The water elevation in the pond fluctuates somewhat depending on the amount of rainfall, but typically ranges from 11 to 12 feet MSL. The ground level varies across the site from 8 feet to 17 feet, but averages between 12 and 13 ft.

The brine site is located outside of any FEMA indicated flood zones and is assigned Zone X, which indicates the site is not in a flood zone. The nearest identified flood zone is located south of the Brine Facility and has an assigned flood elevation of 17 feet.

The top of the containment levee elevation was selected to be set at 17 feet based on the downstream flood elevation set by FEMA. See Figure 3 for the location of Brine site in relation to flood zone that occurs due to a 100 year flooding event with a storm surge in Calcasieu River.

The elevation, 17 feet, works well with the diameter of the drainage weir pipes that are required due to the size of the containment area.

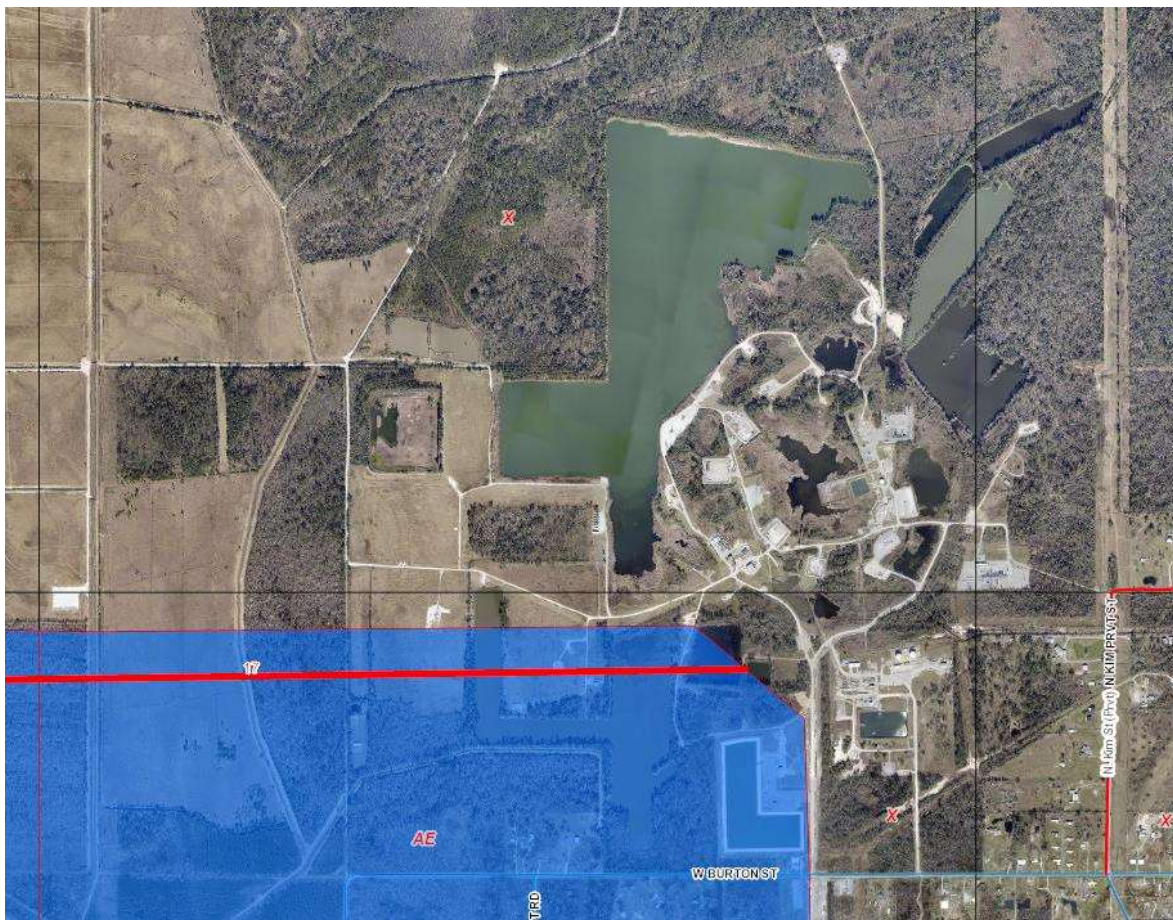


Figure 3 – FEMA 100 Year Flood Zone Map

## 4.5 LEVEE CONFIGURATION

The top of the containment levee will be approximately five feet above the existing pond water elevation that is set at 17 feet MSL. The levee top will be the access road for the containment system and is 14 to 16 feet wide to provide mobility for vehicles and equipment. The top will be surfaced with crushed aggregate placed on top of a geotextile fabric. Side slopes of the fill material will be 2 on 1. The total base width of the levee will vary depending on the existing ground elevations but can approach a width of forty feet. See levee detail in appendix drawing SK-APP1-05.

## 4.6 CONTAINMENT LEVEE CONSTRUCTION MATERIALS

Clay soil material has been selected as the main levee construction material due to its low permeability properties and reliability over long durations. The following table includes the main materials required for construction of the containment levee.

**Construction Materials and Supplies**

ITEM	APPROXIMATE QUANTITY
Clay Soil Material	81,000 cubic yards
Sheet Piles (24 ft long)	1,162 feet
Impermeable flexible barrier	1200 feet by 14 ft wide
Geotextile Fabric	16,500 feet at 16 feet wide
Aggregate	6,500 cubic yards
Weir Structures	2 major and 1 minor (3 total)
Grass Seeding	12 acres

## **APPENDIX 1**

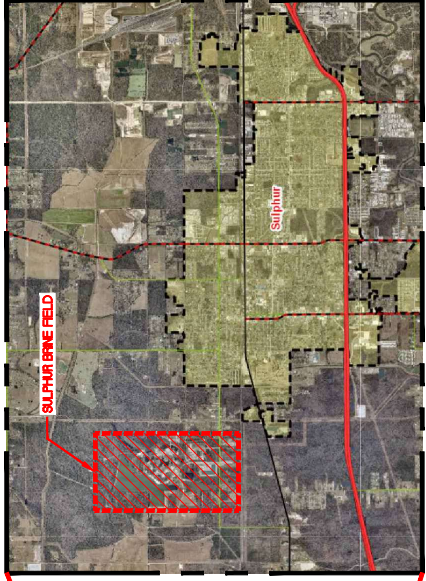
# WESTLAKE US2, LLC

## CALCASIEU PARISH, LOUISIANA

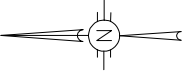
### SULPHUR BRINE FIELD CONTAINMENT LEVEE



STATE MAP  
SCALE: N.T.S.



VICINITY MAP  
SCALE: N.T.S.



**REVISIONS**

ISSUED FOR CONSTRUCTION	
DATE	
BY	

ALL PRINTS DATED BEFORE LAST REVISION ARE CANCELLED AND RECALLED.

**SHEET INDEX:**

- SK-APPI-01 COVER SHEET
- SK-APPI-02 SITE PLAN
- SK-APPI-03 CONTAINMENT SYSTEM ROUTING PLAN
- SK-APPI-04 NBR. STRUCTURE AND PUMPS PLAN
- SK-APPI-05 DETAILS

**RECON**  
 REGISTERED PROFESSIONAL ENGINEER  
 STATE OF LOUISIANA  
 No. 32862  
 Sulphur, LA  
 FILE# SC-APPI-01-DWG  
 APPROVED:



Westlake Facilities  
 Chlor-Alkali & Derivatives  
 Lake Charles South Complex  
 300 FPC Drive, Westlake, LA 70689

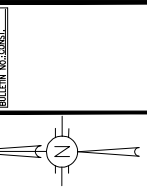
SULPHUR BRINE FIELD	CONTAINMENT LEVEE	CIVIL			
COVER SHEET	COVER SHEET				
DRAWN BY	B. WHITTINGTON	DATE	11/2023	SCALE	AS SHOWN
CHECKED BY		DATE		CHARGE	
APPROVED BY		DATE		SHEET	1 OF 3

DATE: 11/2023  
**ISSUE FOR RECORD**

DWG. SK-APPI-01



REVISIONS	
ISSUED FOR CONSTRUCTION	
DATE: 11/17/2023	
BY: BWHITTINGTON	



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**NOTES:**

- TWO WEIR STRUCTURES ARE TO BE CONSTRUCTED TO CONTROL POND WATER LEVELS TO 18'00".
- STRUCTURE 1 DISCHARGES TO BAYOU THROUGH DRAINAGE LATERAL AND CHANNELED DRAINAGE TO BAYOU. STRUCTURE 2 DISCHARGES TO BAYOU THROUGH DRAINAGE LATERAL AND CHANNELED DRAINAGE TO BAYOU. POND LOCATED TO THE EAST OF THE FINAL OUTFALL TO BAYOU DRAINAGE.

**CONTAINMENT LEVEL NOTES:**

- APPROX. AREA WITHIN LEVELS: 284.3 ACRES
- APPROX. AREA TO BE CLEARED FOR LEVEE: 16.1 ACRES
- APPROX. LENGTH OF LEVEE: 18.74 MI
- APPROX. LENGTH OF SHEET FILE: 1.162'

**LEGEND:**

- CONTAINMENT LEVEL
- IMPACT ZONE ESTIMATE FROM LONGHORN FROM LONGHORN REPORT DATED NOVEMBER 2, 2023

**REGISTERED PROFESSIONAL ENGINEER**  
 STATE OF LOUISIANA  
 No. 10775  
 DATE: 11/17/2023  
 SCALE: AS SHOWN  
 SHEET 1 OF 3  
 DWG. SK-APP1-03

**Westlake**  
 Westlake Services  
 1001 FPC Drive, Metairie, LA 70002  
 CIVIL  
 CONTAINMENT LEVEL  
 CONTAINMENT SYSTEM PLAN  
 DRAWN BY: B. WHITTINGTON DATE: 11/17/2023 SCALE: AS SHOWN  
 CHECKED BY: DATE: CHANGE NO. SHEET 1 OF 3  
 APPROVED BY: DATE: DWG. SK-APP1-03

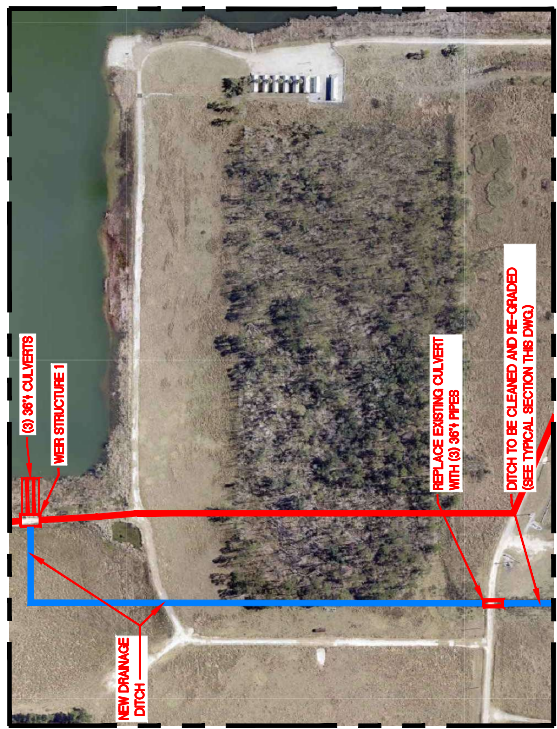
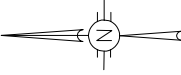


CONTAINMENT LEVEL AND IMPACT ZONE  
SCALE: 1" = 300'

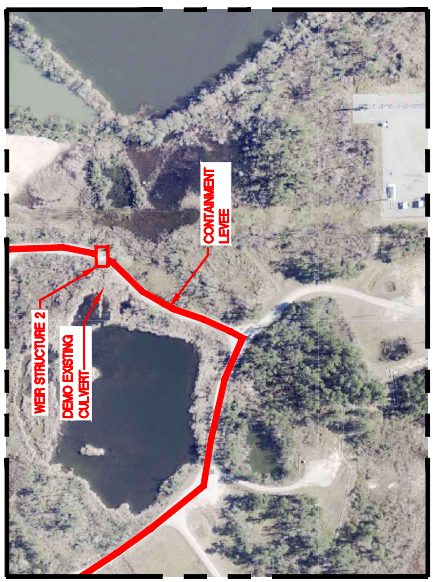
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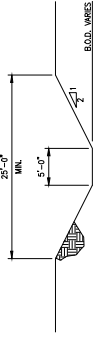
WEIR STRUCTURE 1  
SCALE: 1" = 150'



WEIR STRUCTURE 2  
SCALE: 1" = 150'



PUMP STATION  
SCALE: 1" = 100'



SECTION  
DRAINAGE DITCH  
SCALE: 1/8" = 1'-0"

**RECON**  
FLORIDA REGISTERED PROFESSIONAL ENGINEER  
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SULPHUR LA. FL 32688-5610  
APPROVED: \_\_\_\_\_

**Westlake**  
Westlake Services  
Chlor-Alkali & Derivatives  
Lake Charles South Complex  
100 FPC Drive, Westlake, LA 70689

SULPHUR BRINE FIELD		CIVIL	
CONTAINMENT LEVEE		WEIR STRUCTURE AND PUMPS PLAN	
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CHECKED BY		SCALE	AS SHOWN
APPROVED BY		CHARGE	
		SHEET	1 OF 3
		DWG. SK-APP1-04	

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