

J:\101\01\120VAT\EX6-5\_PSurf\_6-10.dwg Layout: POTEN SURFACE User: gwhite

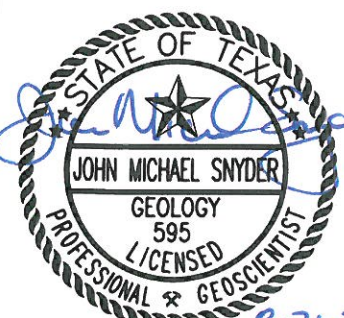


**LEGEND**

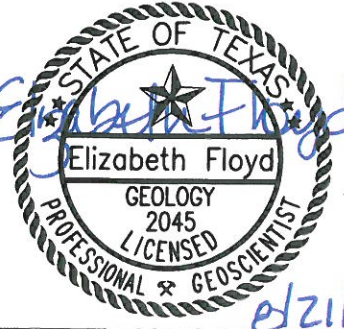
- PERMIT BOUNDARY
- LANDFILL FOOTPRINT
- EXISTING 10' GROUND CONTOUR
- PROPOSED POINT OF COMPLIANCE LINE
- ⊕ MW-5 EXISTING MONITORING WELL
- 400 5' GROUNDWATER CONTOUR
- GROUNDWATER ABSENT
- PRE-SUBTITLE D AREA WITH FINAL COVER

**NOTES:**

1. MONITORING WELL LOCATION MAP MODIFIED FROM ORIGINAL HDR DRAWING.
2. EXISTING CONTOURS COMPILED BY AEROMETRIC FROM AERIAL PHOTOGRAPHY, FLOWN MARCH 6, 2011. COORDINATE SYSTEM IS BASED ON TEXAS STATE PLANE NAD 27, TEXAS NORTH CENTRAL ZONE, US FEET.




8-21-2012



8/21/2012

**POTENTIOMETRIC SURFACE  
JUNE 2010**

**WASTE MANAGEMENT OF TEXAS, INC.  
SKYLINE LANDFILL  
MAJOR PERMIT AMENDMENT**



**BIGGS & MATHEWS  
ENVIRONMENTAL  
CONSULTING ENGINEERS**

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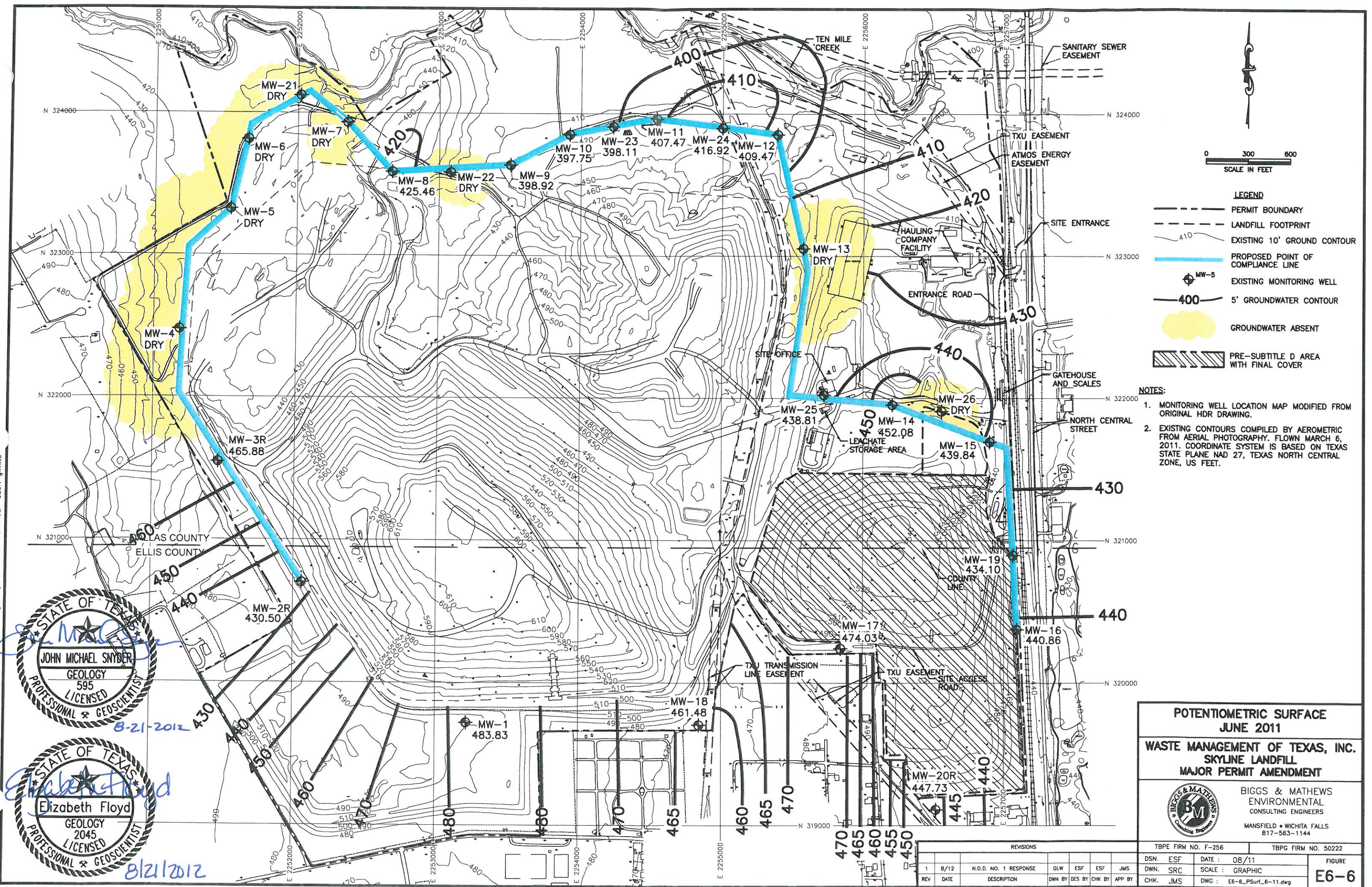
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REVISIONS		TBPE FIRM NO. F-256		TBPG FIRM NO. 50222	
1	8/12	N.O.D. NO. 1 RESPONSE	GLW	ESF	JMS
REV	DATE	DESCRIPTION	DWN BY	DES BY	CHK BY

DSN. ESF	DATE : 04/12	FIGURE
DWN. SRC	SCALE : GRAPHIC	E6-5
CHK. JMS	DWG : E6-5_PSurf_6-10.dwg	



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- LEGEND**
- PERMIT BOUNDARY
  - LANDFILL FOOTPRINT
  - 410 EXISTING 10' GROUND CONTOUR
  - PROPOSED POINT OF COMPLIANCE LINE
  - ⊕ MW-5 EXISTING MONITORING WELL
  - 400 5' GROUNDWATER CONTOUR
  - ☀️ GROUNDWATER ABSENT
  - ▨ PRE-SUBTITLE D AREA WITH FINAL COVER

- NOTES:**
1. MONITORING WELL LOCATION MAP MODIFIED FROM ORIGINAL HDR DRAWING.
  2. EXISTING CONTOURS COMPILED BY AEROMETRIC FROM AERIAL PHOTOGRAPHY, FLOWN MARCH 6, 2011. COORDINATE SYSTEM IS BASED ON TEXAS STATE PLANE NAD 27, TEXAS NORTH CENTRAL ZONE, US FEET.

STATE OF TEXAS  
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**POTENTIOMETRIC SURFACE  
 JUNE 2011**

**WASTE MANAGEMENT OF TEXAS, INC.  
 SKYLINE LANDFILL  
 MAJOR PERMIT AMENDMENT**

**BIGGS & MATHEWS**  
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TBPE FIRM NO. F-256      TBPG FIRM NO. 50222

DSN. ESF      DATE : 08/11      FIGURE  
 DWN. SRC      SCALE : GRAPHIC      E6-6  
 CHK. JMS      DWG : E6-6\_PSurf\_6-11.dwg

REVISIONS						
REV	DATE	DESCRIPTION	DWN BY	DES BY	CHK BY	APP BY
1	8/12	N.O.D. NO. 1 RESPONSE	GLW	ESF	ESF	JMS





# COMPUTATION SHEET

Project Title: Waste Management - Skyline RDF

Description: Groundwater Flow Velocity Calculations

101.01.120

Prep. By: ESF

Date: 7/19/2012

JMS

Sheet 1 | 1

Date: 7/20/2012

## GROUNDWATER VELOCITY CALCULATIONS

*Uppermost Aquifer - Stratum I*

2012

$$V = \frac{Ki}{n_e}$$

WHERE:

V = Groundwater Flow Velocity

K = Hydraulic Conductivity

i = Hydraulic Gradient

$n_e$  = Effective Porosity

### Velocity calculation using geometric mean value for K

$$\begin{aligned} K &= 4.23E-09 \text{ cm/sec} \\ i &= 0.023 \text{ ft/ft} \\ n_e &= 0.05 \end{aligned}$$

$$V = \frac{4.23E-09 \times 0.023}{0.05} \times 2835 = 5.518E-06 \text{ ft/day}$$

$$= 5.518E-06 \times 365 \times 2.01E-03 \text{ ft/year}$$

### Velocity calculation using arithmetic mean value for K

$$\begin{aligned} K &= 7.63E-09 \text{ cm/sec} \\ i &= 0.023 \text{ ft/ft} \\ n_e &= 0.05 \end{aligned}$$

$$V = \frac{7.63E-09 \times 0.023}{0.05} \times 2835 = 9.95E-06 \text{ ft/day}$$

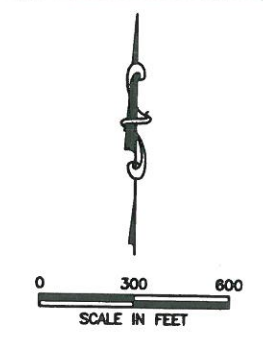
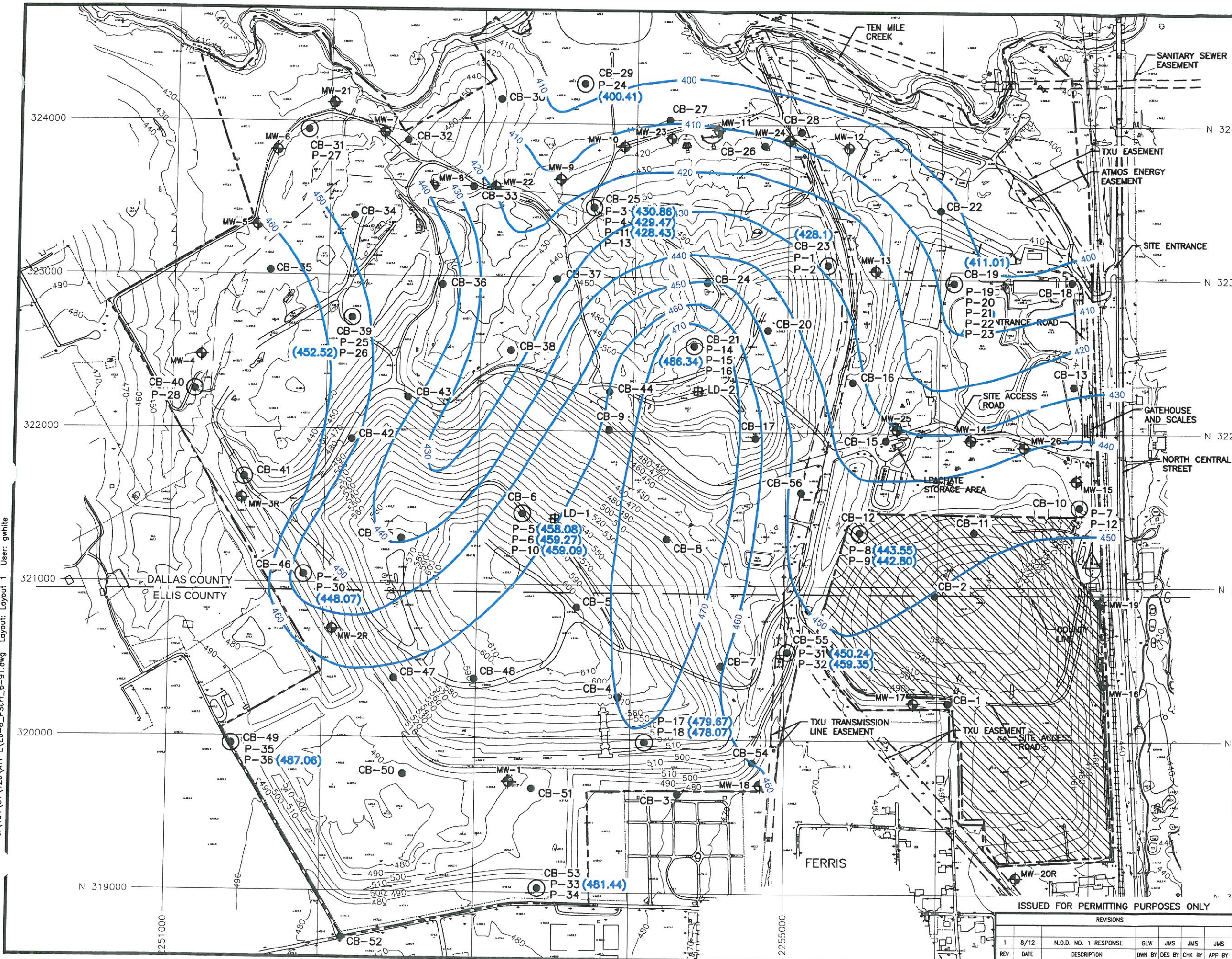
$$= 9.950E-06 \times 365 \times 3.63E-03 \text{ ft/year}$$

- Hydraulic Conductivity value (K) from site specific field permeability tests (HDR, 1993)
- Hydraulic Gradient value (i) from June 2010 potentiometric surface maps (see Figure E6-5)
- Effective porosity value ( $n_e$ ) from the lithologic materials represented in the geologic units (HDR, 1993)

Figure E6-7

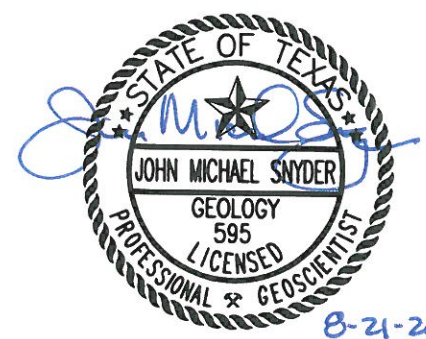


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- LEGEND**
- PERMIT BOUNDARY
  - LANDFILL FOOTPRINT
  - 410 EXISTING 10' GROUND CONTOUR
  - 450 10' GROUNDWATER CONTOUR
  - MW-5 EXISTING MONITORING WELL
  - CB-15 BORING
  - P-1 PIEZOMETER
  - ▨ PRE-SUBTITLE D AREA WITH FINAL COVER

- NOTES:**
1. MONITORING WELL LOCATION MAP MODIFIED FROM ORIGINAL HDR DRAWING.
  2. EXISTING CONTOURS COMPILED BY AEROMETRIC FROM AERIAL PHOTOGRAPHY, FLOWN MARCH 6, 2011. COORDINATE SYSTEM IS BASED ON TEXAS STATE PLANE NAD 27, TEXAS NORTH CENTRAL ZONE, US FEET.



**POTENTIOMETRIC SURFACE MAP  
JUNE 1991 PRE-EXCAVATION**  
**WASTE MANAGEMENT OF TEXAS, INC.**  
**SKYLINE LANDFILL**  
**MAJOR PERMIT AMENDMENT**



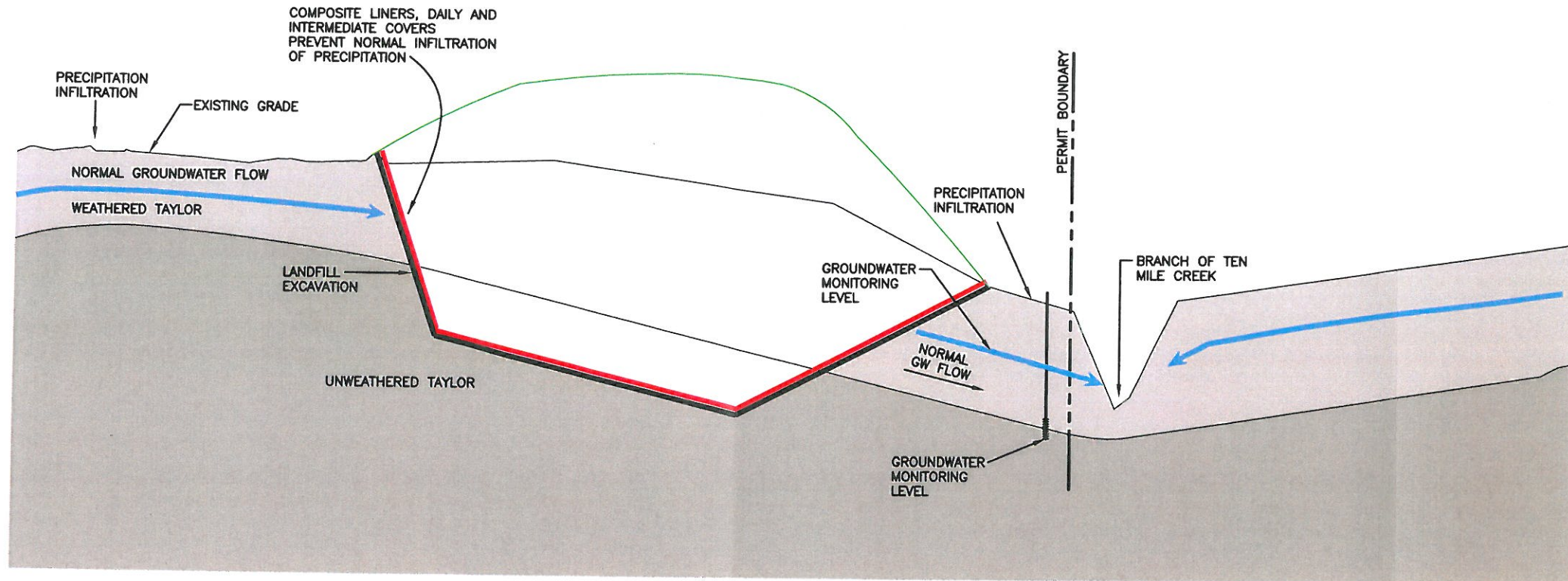
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1	8/12	N.O.D. NO. 1 RESPONSE	GLW	JMS	JMS	JMS
REV	DATE	DESCRIPTION	DWN	DES	CHK	APP

DSN. ESF	DATE : 04/12	FIGURE
DWN. SRC	SCALE : GRAPHIC	
CHK. JMS	DWG : E6-8_PSurf_6-91.dwg	<b>E6-8</b>





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8/21/2012

8-21-2012

CONCEPTUAL HYDROGEOLOGIC  
 CROSS SECTION

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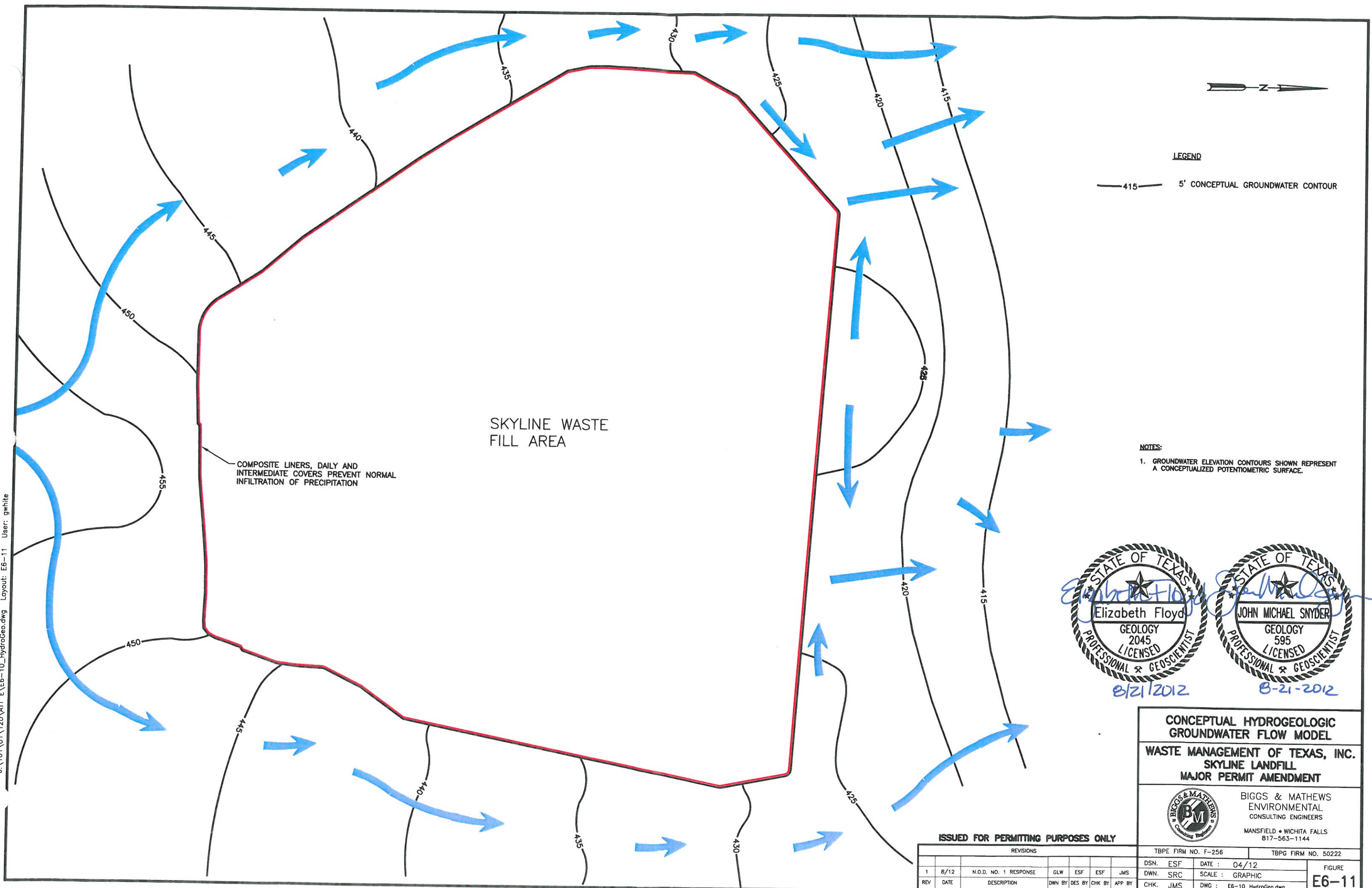
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REVISIONS							TBPE FIRM NO. F-256	TBPG FIRM NO. 50222
1	8/12	N.O.D. NO. 1 RESPONSE	GLW	ESF	ESF	JMS	DSN. ESF	DATE : 04/12
REV	DATE	DESCRIPTION	DWN BY	DES BY	CHK BY	APP BY	DWN. SRC	SCALE : GRAPHIC
							CHK. JMS	DWG : E6-10_HydroGeo.dwg

FIGURE  
**E6-10**



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LEGEND

— 415 — 5' CONCEPTUAL GROUNDWATER CONTOUR

NOTES:

- 1. GROUNDWATER ELEVATION CONTOURS SHOWN REPRESENT A CONCEPTUALIZED POTENTIOMETRIC SURFACE.

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 PROFESSIONAL GEOSCIENTIST  
 8-21-2012

CONCEPTUAL HYDROGEOLOGIC  
 GROUNDWATER FLOW MODEL  
 WASTE MANAGEMENT OF TEXAS, INC.  
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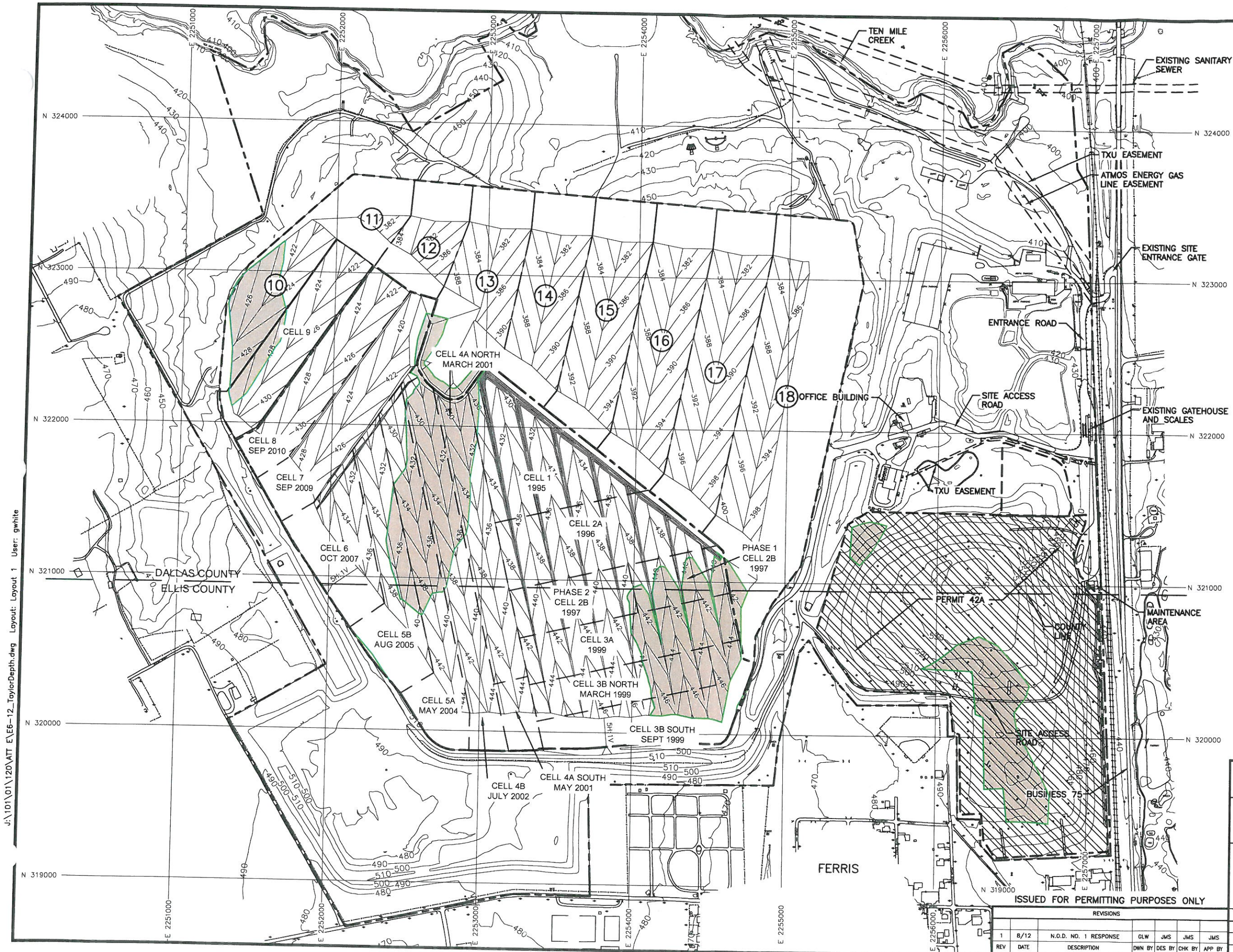
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REVISIONS							TBPE FIRM NO. F-256		TBPG FIRM NO. 50222	
1	8/12	N.O.D. NO. 1 RESPONSE	GLW	ESF	ESF	JMS	DSN.	ESF	DATE :	04/12
REV	DATE	DESCRIPTION	DWN BY	DES BY	CHK BY	APP BY	DWN.	SRC	SCALE :	GRAPHIC
							CHK.	JMS	DWG :	E6-10_HydroGeo.dwg

FIGURE  
**E6-11**



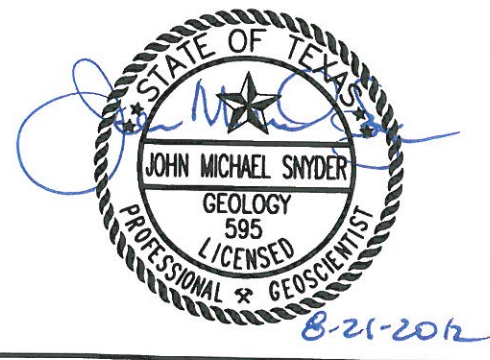


0 300 600  
SCALE IN FEET

**LEGEND**

- PERMIT BOUNDARY
- LANDFILL FOOTPRINT
- EXISTING 10' GROUND CONTOUR
- 2' EXCAVATION CONTOUR
- DEVELOPED LIMIT OF WASTE
- WEATHERED TAYLOR REMAINING
- PRE-SUBTITLE D AREA WITH FINAL COVER

- NOTES:**
- EXISTING CONTOURS COMPILED BY AEROMETRIC FROM AERIAL PHOTOGRAPHY, FLOWN MARCH 6, 2011. COORDINATE SYSTEM IS BASED ON TEXAS STATE PLANE NAD 27, TEXAS NORTH CENTRAL ZONE, US FEET.
  - BOTTOM OF 42-A EXCAVATION IS BASED ON INFORMATION FROM THE 1978 PERMIT APPLICATION AND INFORMATION PROVIDED BY WASTE MANAGEMENT.



**EXCAVATION PLAN SHOWING REMAINING WEATHERED TAYLOR MARL**  
**WASTE MANAGEMENT OF TEXAS, INC.**  
**SKYLINE LANDFILL**  
**MAJOR PERMIT AMENDMENT**

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1	B/12	N.O.D. NO. 1 RESPONSE	GLW	JMS	JMS	JMS	
REV	DATE	DESCRIPTION	DWN BY	DES BY	CHK BY	APP BY	

DSN. ESF	DATE : 08/12	FIGURE <b>E6-12</b>
DWN. SRC	SCALE : GRAPHIC	
CHK. JMS	DWG : E6-12_TaylorDepth.dwg	

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