CITY OF HOUSTON
MUNICIPAL SETTING DESIGNATION APPLICATION
FOR

HOUSTON POLICE FEDERAL CREDIT UNION PROPERTY
1600/1714/1716/1720 MEMORIAL DRIVE AND
1708 STATE STREET
HOUSTON, HARRIS COUNTY, TEXAS

SKA PROJECT NO. 17010-0002

Prepared for:

HOUSTON POLICE FEDERAL CREDIT UNION
1600 MEMORIAL DRIVE
HOUSTON, TEXAS 77007

Prepared by:

SKA CONSULTING, L.P.
1515 WITTE ROAD, SUITE 150
HOUSTON, TEXAS 77080

Prepared by:

REBEKKAH C. NELSON, P.E.
PROJECT ENGINEER

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PROJECT MANAGER

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Reviewed by:

MIKE SCHULTZ, P.E.
VICE-PRESIDENT AND PARTNER

Mike Schultz
SIGNATURE

OCTOBER 2012

TEXAS REGISTERED ENGINEERING FIRM NO. F-005009
TEXAS REGISTERED GEOSCIENCE FIRM NO. 50011

CITY OF HOUSTON

PUBLIC WORKS AND ENGINEERING
PLANNING & DEVELOPMENT DIVISION

Application for Approval of Municipal Setting Designation

APPLICANT INFORMATION

Applicant's Name: Houston Police Federal Credit Union

☐ Individual ■ Private Entity ☐ Public Entity ■ Non-Profit Entity ☐ Other _____

Address: 1600 Memorial Drive (Street) | Houston (City) | TX (State) | 77007 (Zip)

Phone No.: 713-986-0200 Fax No.: 713-986-0300

Email: atalley@hpfcu.org

Contact Information

Name of Contact: Ayn Kleiber Talley

Title: President, Houston Police Federal Credit Union

Address: 1600 Memorial Drive (Street) | Houston (City) | TX (State) | 77007 (Zip)

Phone No.: 713-986-0200 Fax No.: 713-986-0300

Email: atalley@hpfcu.org

SITE INFORMATION

Site HCAD No(s): 0052330000006, 0052330000001 0052330000008, 0052330000009, 0052320000004, 0052330000003, 0052330000017 0052330000005, 0052330000004, 0052330000002, 0052330000011, 0052330000010

Site Name: Houston Police Federal Credit Union Property

Site Size: 2.259 acres

Site Address: 1600/1714/1716/1720 North Memorial Way and 1708 State Street Houston, TX 77007
(Street) (City) (State) (Zip)

(List all owners – additional sheet is attached, if needed)

Owner: Houston Police Federal Credit Union

Owner Address: 1600 Memorial Drive (Street) | Houston (City) | TX (State) | 77007 (Zip)

Name of Contact: Ayn Kleiber Talley

Title: President

Organization: Houston Police Federal Credit Union

Phone No.: 713-986-0200 Fax No.: 713-986-0300

Email: atalley@hpfcu.org

Executive Summary

SKA Consulting, L.P. (SKA), on behalf of Houston Police Federal Credit Union (HPFCU), has prepared this Municipal Setting Designation (MSD) Application for approximately 2.2587 acres of privately-owned, commercially-developed land identified as the "designated property." The designated property is located north of Memorial Drive between Sabine Street and Trinity Street, approximately 0.32 miles west of the intersection of I-45 and Memorial Drive in Houston, Harris County, Texas.

No municipalities, other than the City of Houston, have corporate limits within one-half mile of the boundary of the designated property. In addition, public drinking water is currently available to the designated property and properties located within a one-half mile radius surrounding the designated property by the City of Houston public water supply system.

The designated property consists of the following parcels of land:

- Privately owned, unoccupied, commercial land (1708 State Street parcel, ±0.1152 acres)
- Privately owned, unoccupied, commercial land (1714/1716 Memorial Drive parcel, ±0.7961 acres);
- Privately owned commercial land occupied by the Houston Police Federal Credit Union (HPFCU) (1600 Memorial Drive parcel, ±0.9680 acres); and
- Privately owned commercial land occupied by the HPFCU (1720 Memorial Drive parcel, ±0.3794 acres).

Properties in the vicinity of the designated property are predominantly mixed commercial and single-family residential. The proposed future use of the designated property is anticipated to remain commercial.

According to records obtained from the Texas Commission on Environmental Quality (TCEQ), the Harris-Galveston Subsidence District, and GeoSearch, Inc. (GeoSearch), approximately 454 registered/permitted water wells are reportedly located within a 5-mile radius of the designated property. Of these, 12 are reportedly located within a 0.5-mile radius of the designated property. There are no water wells within 500 feet of the designated property and two water wells within 1,000 feet of the designated property. The closest of these water wells is reportedly located approximately 740 feet south of the designated property and the other is reportedly located approximately 790 feet southwest of the designated property. Both of these water wells are reportedly screened in groundwater bearing units (GWBUs) occurring more than 460 feet below ground surface (ft-bgs). As such, neither well should be affected by contaminants present in soil or groundwater at the designated property. Due to the distance from the designated property (greater than approximately 1,200 feet) the remaining ten wells within a half-mile radius are unlikely to be affected by contaminants present in the soil or groundwater at the designated property.

Of the approximately 454 registered/permitted water wells reportedly located within 5 miles of the designated property, approximately 12 are reportedly owned or operated by a public retail water utility. One of the 12 water wells reportedly located within 5 miles of the designated property is reportedly owned by municipalities or institutions other than the City of Houston. This municipality is the City of West University Place.

Presently, the designated property's ±2.2587 acres of commercially developed land are owned by HPFCU. Approximately 0.9113 acres of the central portion of the designated property (1708 State Street parcel and 1714/1716 Memorial Drive parcel) is enrolled in the TCEQ Voluntary Clean-Up Program (VCP) as ID No. 2427. The 1600 Memorial Drive parcel (±0.9680 acres) is utilized as a bank and office for HPFCU. The 1720 Memorial Drive parcel (±0.3794 acres) is utilized as a bank drive-thru for HPFCU. The designated property is currently being assessed for adverse environmental impacts identified in connection with the former tenant (Professional Service Industries, Inc. [PSI]), on the 1708 State Street parcel and 1714/1716 Memorial Drive parcel. These assessments are being conducted by SKA, on behalf of HPFCU, under the rules of the TCEQ's Texas Risk Reduction Program (TRRP) found in 30 Texas Administrative Code (TAC) 350.

The results of soil assessment activities performed to date on the designated property have identified detectable concentrations of several volatile organic compounds (VOCs). However, only three VOCs (tetrachloroethene [PCE], trichloroethene [TCE], and cis-1,2-dichloroethene [cis-1,2-DCE]) exceeded the TRRP Tier 1 residential soil-to-groundwater ingestion ($^{GW}Soil_{Ing}$) protective concentration levels (PCLs) on two separate, non-contiguous areas located on the 1708 State Street parcel and the 1714/1716 Memorial Drive parcel, distinguishing two distinct soil PCLE zones (see ***Figure C.7***). A TCE PCL exceedance (PCLE) zone is located on the western portion of the 1708 State Street parcel. A second TCE PCLE zone is located in the northeast portion of the 1714/1716 Memorial Drive parcel and encompasses a smaller PCE and cis-1, 2-DCE PCLE zone. The two soil PCLE zones are delineated and contained within the boundaries of the designated property.

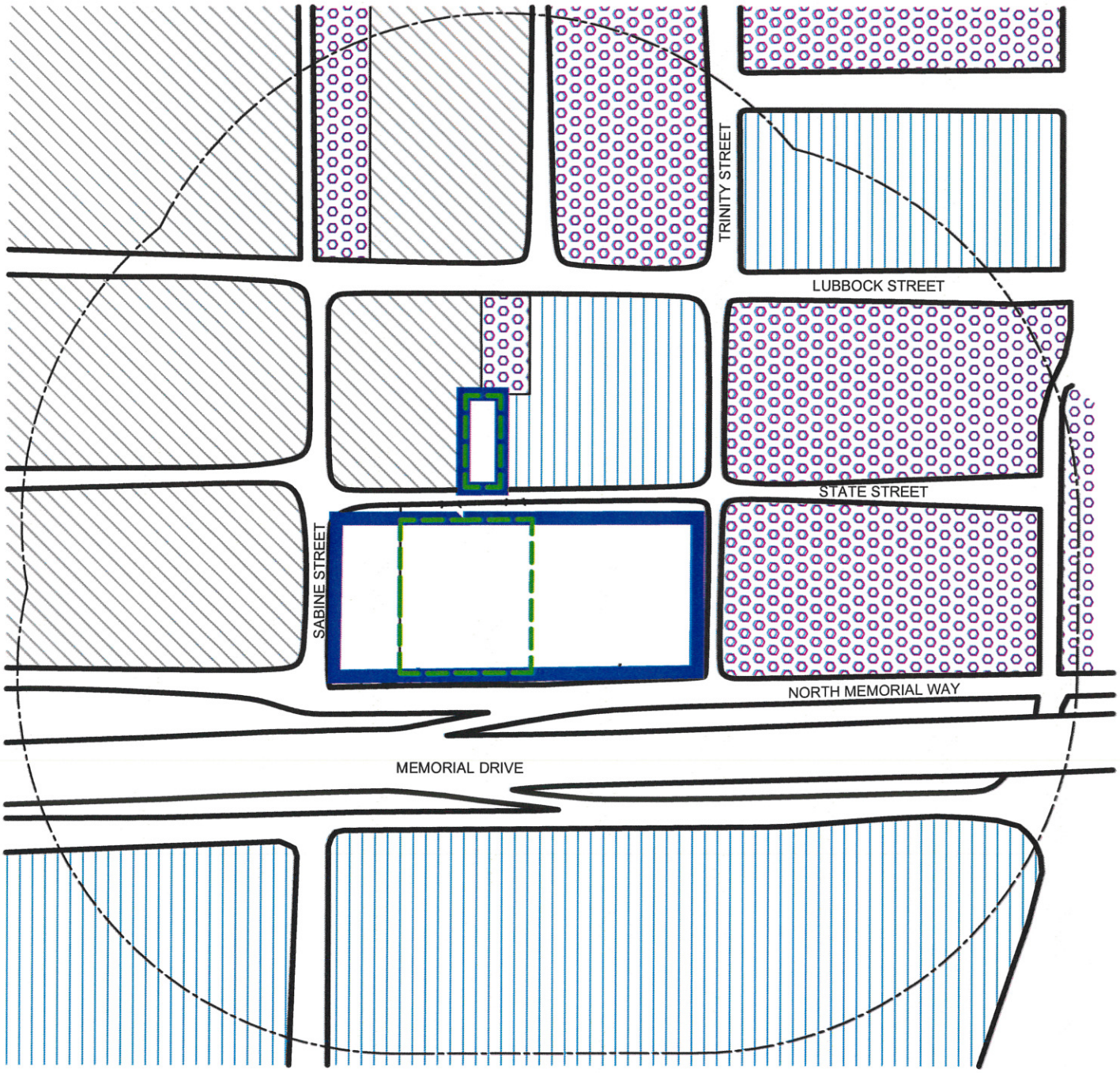
None of the chemicals of concern (COCs) detected in the soil at the designated property exceed their applicable TRRP Tier 1 non-ingestion soil PCLs (total soil combined, $^{Tot}Soil_{Comb}$ or soil vapor inhalation, $^{Air}Soil_{Inh\text{-}V}$). As such, no TRRP non-ingestion soil PCLE zones exist at the designated property.

The results of the groundwater monitoring assessment activities performed to date on the designated property have identified detectable concentrations of several VOCs and the C6-C12 fraction of total petroleum hydrocarbons (TPH). However, recent laboratory analytical results indicate that only TCE, cis-1,2-DCE, and 1,1-dichloroethene (1,1-DCE) exhibit concentrations that exceed the TRRP Tier 1 residential groundwater ingestion ($^{GW}GW_{Ing}$) PCLs (see ***Figure C.8***). The TCE groundwater PCLE zone extends from the 1708 State Street parcel, across the 1714/1716 Memorial Drive parcel and 1600 Memorial Drive parcel to the southeast. The TCE PCLE zone extends off-site to the south across City of Houston (COH) right-of-way (Memorial

Drive) and to the east across 1600 State Street (owned and occupied by the Houston Police Officer's Union [HPOU]). The cis-1,2-DCE and 1,1-DCE PCLE zones are fully located within the TCE PCLE zone. The cis-1,2-DCE PCLE zone is located in the southeast portion of the 1600 Memorial Drive parcel, centered on monitoring well TMW-5. The 1,1-DCE PCLE zone is located in the southern portions of the 1714/1716 Memorial Drive parcel and 1600 Memorial Drive parcel, centered on monitoring wells TMW-1 and TMW-5. The groundwater PCLE zones on the designated property are delineated to the west and downgradient to the south and southeast.

The results of assessment and monitoring activities performed to date indicate the TCE, cis-1,2-DCE, and 1,1-DCE groundwater ingestion PCLE zones at the designated property are stable but not contained within the boundaries of the designated property. None of the groundwater detections exceed the TRRP Tier 1 non-ingestion PCLs (groundwater vapor inhalation, $^{Air}GW_{Inh-V}$).

The following Items "A" through "Z" provide the requested documentation corresponding to the Items in the attached City of Houston MSD Application checklist. Supporting documentation for certain Items are attached and included with the Item's corresponding Appendix.



LEGEND

- DESIGNATED PROPERTY BOUNDARY
- VCP NO. 2427 BOUNDARY
- ROADS
- 500' RADIUS

PARCEL LAND USE

- INDUSTRIAL/ COMMERCIAL
- RESIDENTIAL
- OTHER LAND USES (E.G. RECREATION, SCHOOLS, CHURCHES)

0 100 200

APPROXIMATE SCALE: 1"=200'

STATE OF TEXAS
PAUL MICHAEL SCHULTZ
68765
REGISTERED
PROFESSIONAL ENGINEER
10/5/12

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Texas Registered Engineering Firm F-005009
Texas Registered Geoscience Firm 50011

SURROUNDING LAND USE MAP

FIGURE C.4

MUNICIPAL SETTING DESIGNATION APPLICATION
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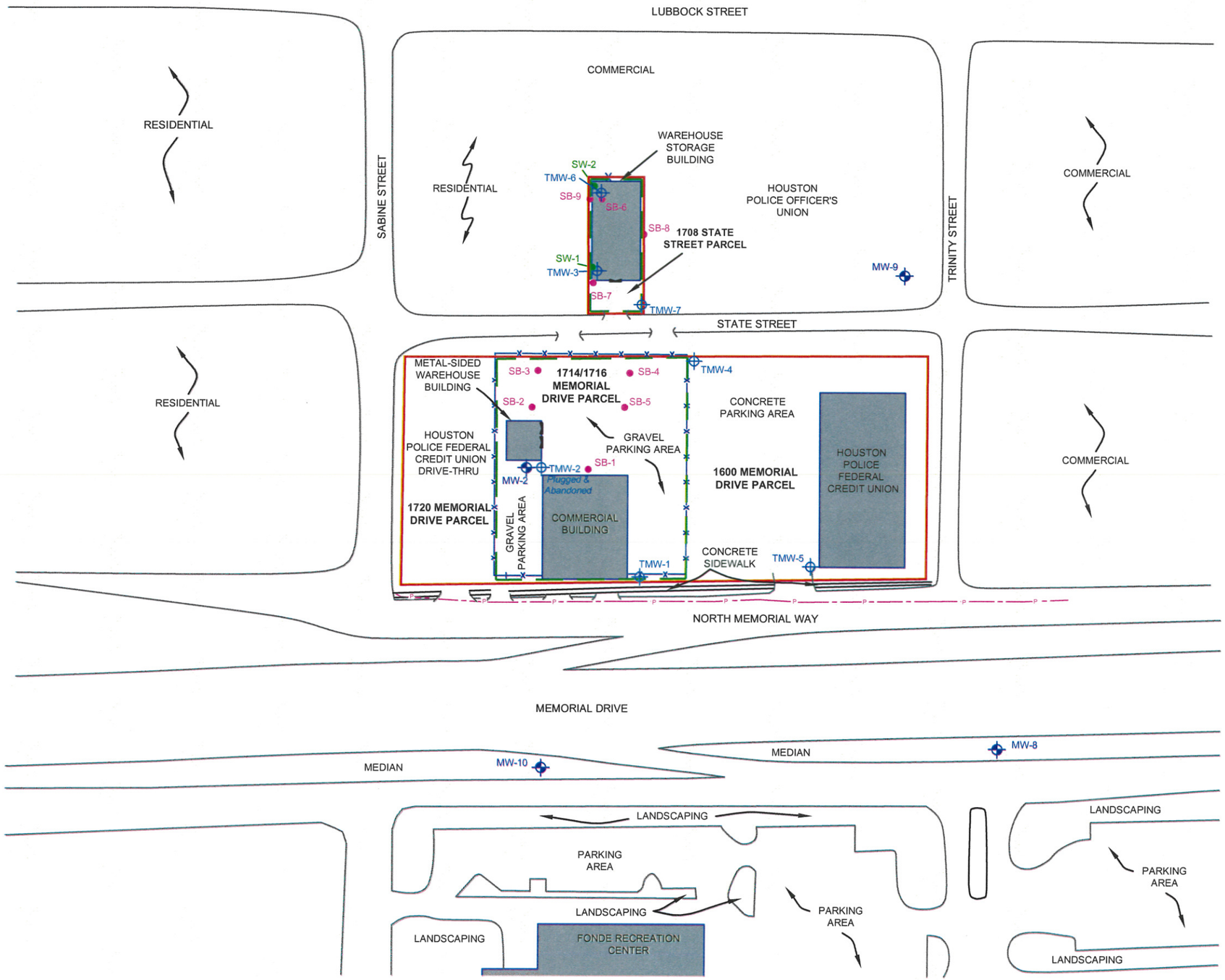
HOUSTON, HARRIS COUNTY, TEXAS

DATE:	OCTOBER 2012	JOB NO:	17010-0002	SCALE:	AS SHOWN
1	FIRST REVISION	-	DRAWN BY:	JCS	
2	SECOND REVISION	-	CHECKED BY:	RCN	
3	THIRD REVISION	-	APPROVED BY:	JRM	

FILE INFO: G:\2010\17010-0002\Dwg\COH MSD\DOC.4.dwg sandersjc NO XREFS ATTACHED



LEGEND

- DESIGNATED PROPERTY BOUNDARY
- VCP NO. 2427 BOUNDARY
- CHAIN-LINK FENCE
- OVERHEAD POWER LINES
- TMW-1 MONITORING WELL LOCATION
- MW-2 MONITORING WELL LOCATION
- SB-1 SOIL BORING LOCATION
- SW-1 WIPE SAMPLE LOCATION
- BAY DOORS

0 25 50

APPROXIMATE SCALE: 1"=50'

STATE OF TEXAS
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SOIL AND GROUNDWATER SAMPLING LOCATION MAP

FIGURE C.5

MUNICIPAL SETTING DESIGNATION APPLICATION
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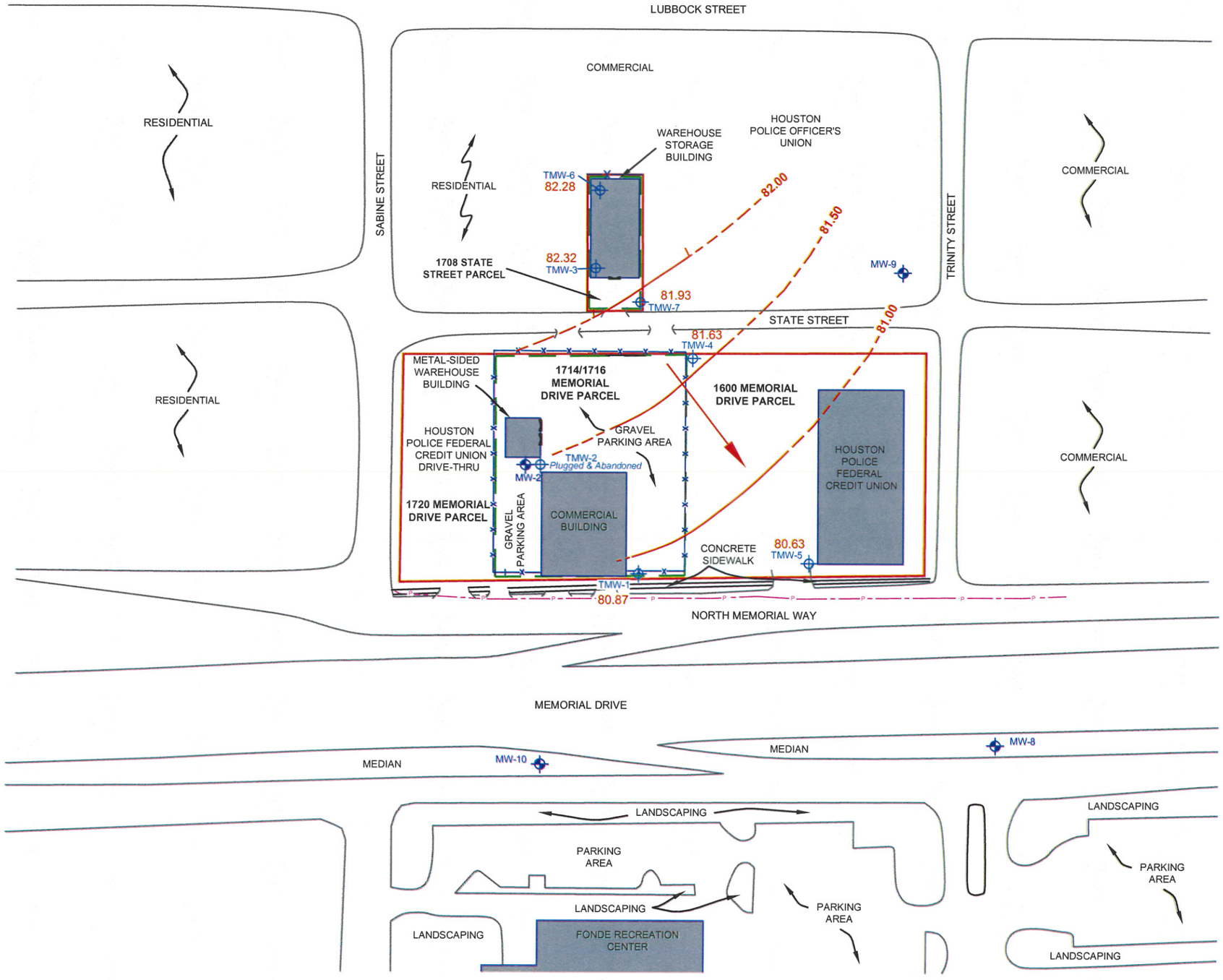
FILE INFO: G:\2010\17010-0002\Dwg\COH MSD\DOC.5.dwg sandersjc NO XREFS ATTACHED



LEGEND

- DESIGNATED PROPERTY BOUNDARY
- VCP NO. 2427 BOUNDARY
- CHAIN-LINK FENCE
- OVERHEAD POWER LINES
- TMW-1 MONITORING WELL LOCATION
- MW-2 MONITORING WELL LOCATION
- BAY DOORS
- 82.28 GROUNDWATER ELEVATION
- GROUNDWATER CONTOURS
- GROUNDWATER FLOW DIRECTION

0 25 50

APPROXIMATE SCALE: 1"=50'

STATE OF TEXAS
PAUL MICHAEL SCHULTZ
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GROUNDWATER GRADIENT MAP
MAY 21, 2012

FIGURE C.6

MUNICIPAL SETTING DESIGNATION APPLICATION
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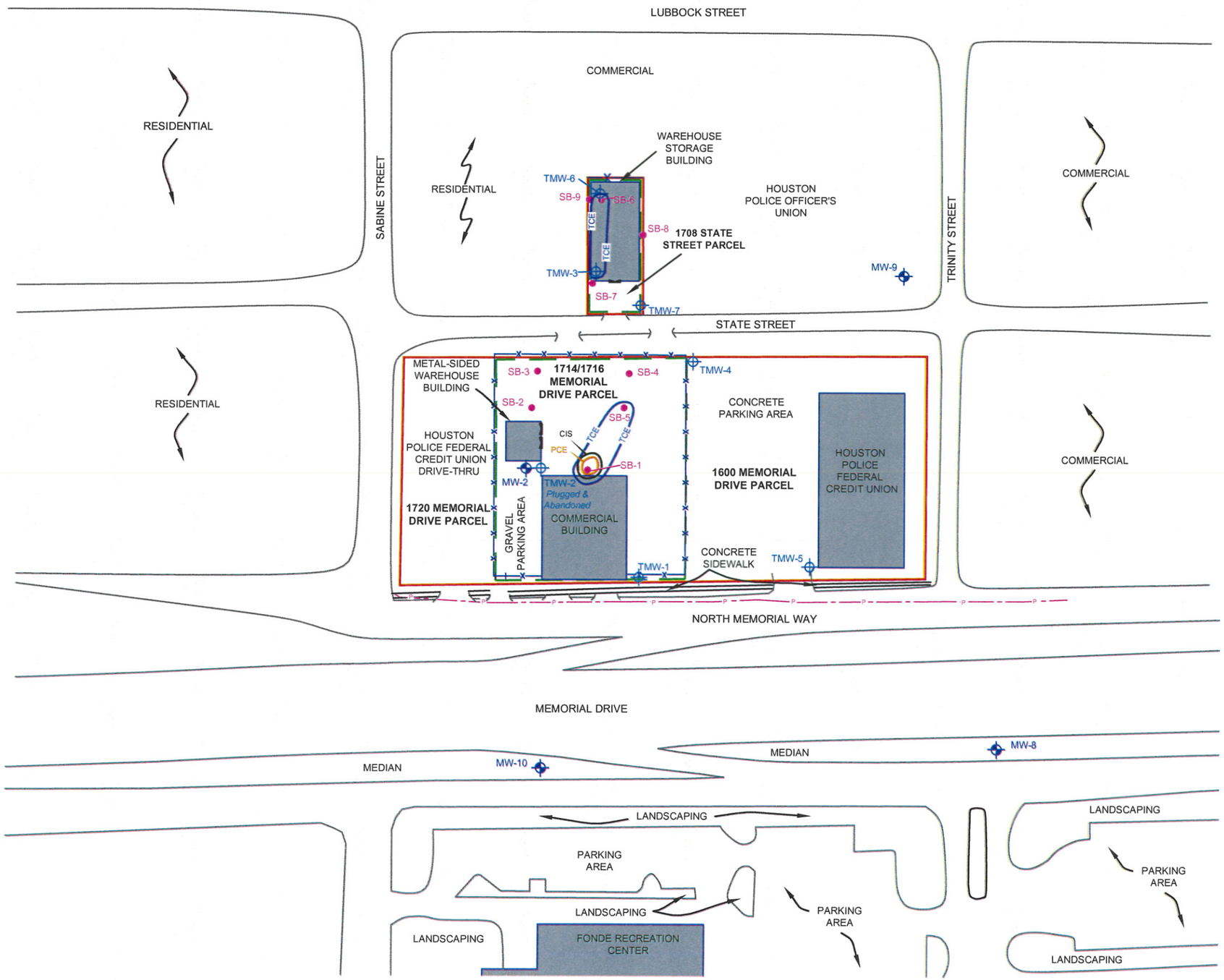
FILE INFO: G:\2010\17010-0002\Dwg\COH MSD\DOC.6.dwg sandersjc NO XREFS ATTACHED



LEGEND

- DESIGNATED PROPERTY BOUNDARY
- VCP NO. 2427 BOUNDARY
- CHAIN-LINK FENCE
- OVERHEAD POWER LINES
- TMW-1 MONITORING WELL LOCATION
- MW-2 MONITORING WELL LOCATION
- SB-1 SOIL BORING LOCATION
- BAY DOORS
- PCE TETRACHOROETHENE PCLE ZONE
- TCE TRICHLOROETHENE PCLE ZONE
- CIS CIS 1,2-DICHLOROETHENE PCLE ZONE

0 25 50

APPROXIMATE SCALE: 1"=50'

STATE OF TEXAS
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PROTECTIVE CONCENTRATION LEVEL EXCEEDANCE ZONE SOIL MAP

FIGURE C.7

MUNICIPAL SETTING DESIGNATION APPLICATION
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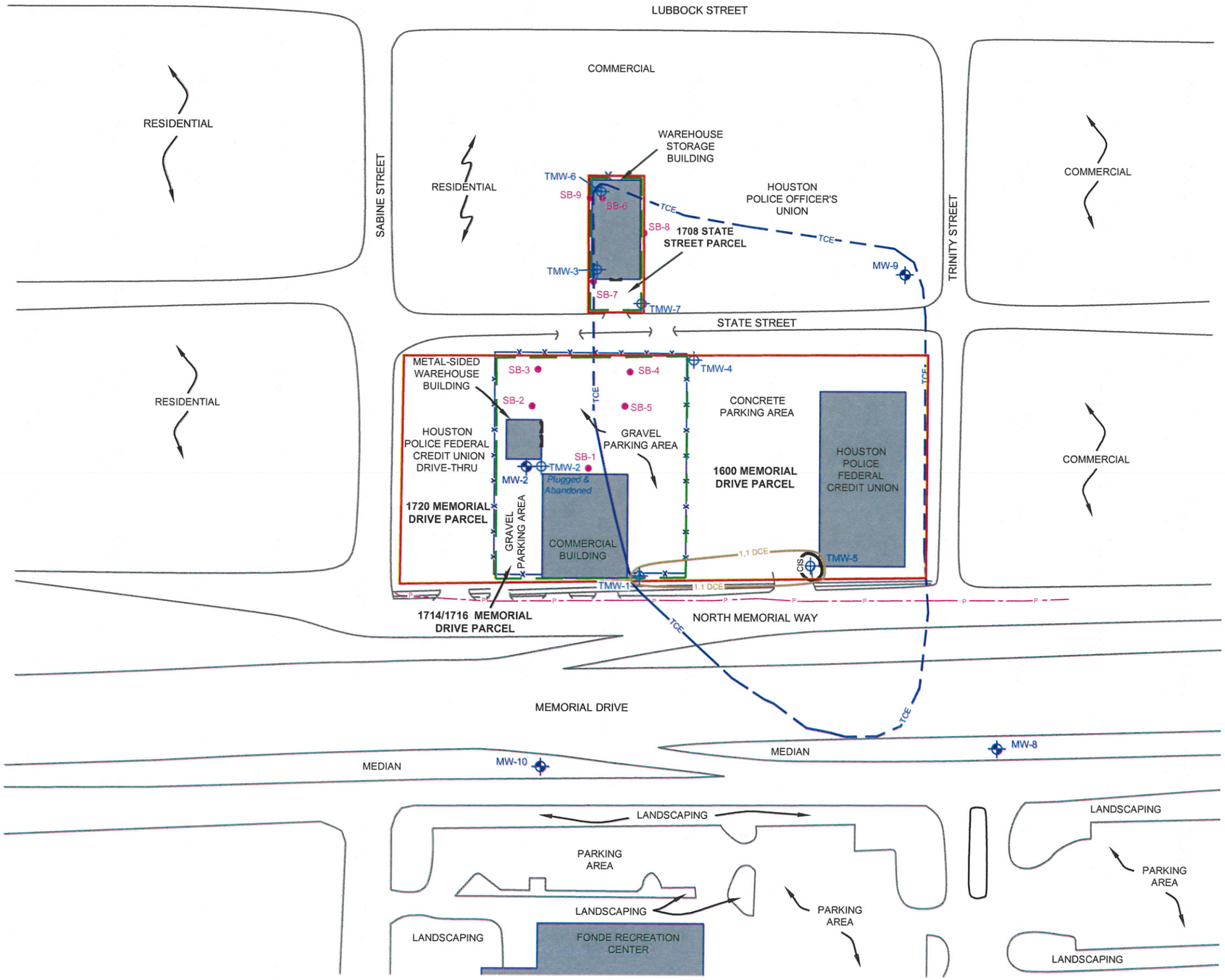
FILE INFO: G:\2010\17010-0002\Dwg\COH MSD\DOC.7.dwg sandersjc NO XREFS ATTACHED



LEGEND

- DESIGNATED PROPERTY BOUNDARY
- VCP NO. 2427 BOUNDARY
- CHAIN-LINK FENCE
- OVERHEAD POWER LINES
- TMW-1 MONITORING WELL LOCATION
- MW-2 MONITORING WELL LOCATION
- SB-1 SOIL BORING LOCATION
- BAY DOORS
- TCE TRICHLOROETHENE PCLE ZONE
- CIS CIS 1,2-DICHLOROETHENE PCLE ZONE
- 1,1 DCE 1,1 DICHLOROETHENE PCLE ZONE

0 25 50

APPROXIMATE SCALE: 1"=50'

STATE OF TEXAS
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PROTECTIVE CONCENTRATION LEVEL EXCEEDANCE ZONE GROUNDWATER MAP

FIGURE C.8

MUNICIPAL SETTING DESIGNATION APPLICATION
HOUSTON POLICE FEDERAL CREDIT UNION PROPERTY
1600/1714/1716/1720 MEMORIAL DRIVE AND
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FILE INFO: G:\2010\17010-0002\Dwg\COH MSD\DOC.8.dwg sandersjc NO XREFS ATTACHED

Appendix D – PCLE Zone Discussion

This section includes a description of the ingestion protective concentration level exceedence zone (PCLE) and non-ingestion PCLE zone, the level of contamination, and the basic geochemical properties of each contaminant of concern on the designated property. PCLs for chemicals of concern (COCs) present in soil and groundwater have been developed for human ingestion and non-ingestion exposure pathways based on TRRP Tier 1 residential soil and groundwater PCLs.

The TRRP PCLs utilized for determination of the designated property's soil and groundwater ingestion and non-ingestion PCLE zones are included in ***Tables D.1*** and ***D.2*** with summaries of all soil and groundwater sampling and analysis results. The locations of all soil and groundwater sampling points are shown on ***Figure C.5***, the groundwater gradient is shown on ***Figure C.6***, and the approximate locations of soil and groundwater ingestion and PCLE zones are shown on ***Figures C.7*** and ***C.8***, respectively.

A discussion of the designated property's TRRP soil and groundwater ingestion and non-ingestion PCLE zones and a discussion of the geochemical properties of the COCs detected in the designated property's soil and groundwater is included below.

Soil PCLE Zones

Soil sampling and analysis results obtained by SKA in September 2010 indicated separate, non-contiguous soil-to-groundwater ingestion PCLE zones located on the 1708 State Street parcel and the 1714/1716 Memorial Drive parcel. There are no soil PCLE zones on the 1720 Memorial Drive parcel or 1600 Memorial Drive parcel. The 1708 State Street parcel and 1714/1716 Memorial Drive parcel are enrolled in the TCEQ VCP as No. 2427. The locations of the designated property's TRRP soil-to-groundwater ingestion PCLE zones are shown on ***Figure C.7***.

1708 State Street parcel

Laboratory analysis results indicated trichloroethene (TCE) concentrations in excess of the applicable TRRP soil-to-groundwater ingestion ($^{GW}Soil_{Ing}$) PCLs in soil borings SB-6, SB-7, and TMW-3 located on the western portion of the1708 State Street parcel. This TCE PCLE zone is delineated to the south by soil borings TMW-4 and SB-4; to the north by soil borings TMW-6; and to the west by soil boring SB-9.

None of the COCs detected in the soil at the 1708 State Street parcel of the designated property exceed their applicable TRRP non-ingestion soil PCLs (TRRP Tier 1 residential $^{Tot}Soil_{Comb}$ PCLs for surface soils or $^{Air}Soil_{Inh\text{-}V}$ PCLs for subsurface soils). As such, no TRRP non-ingestion soil PCLE zones exist at the designated property.

1714/1716 Memorial Drive parcel

Laboratory analysis results indicated TCE concentrations in excess of the applicable TRRP soil-to-groundwater ingestion PCLs ($^{GW}Soil_{Ing}$) in soil borings SB-1 and SB-5 located on the northern portion of the 1714/1716 Memorial Drive parcel. Within the TCE PCLE zone, tetrachloroethene (PCE) and cis-1,2-dichloroethene (cis-1,2-DCE) PCLE zones are located in the vicinity of soil boring SB-1.

The TCE PCLE zone is delineated to the north by SB-4; to the south by soil boring TMW-1; and to the west by soil boring SB-2. The PCE and cis-1,2-DCE PCLE zones are fully located within the TCE PCLE zone and contained only in soil boring SB-1.

None of the COCs detected in the soil at the 1714/1716 Memorial Drive parcel of the designated property exceed their applicable TRRP non-ingestion soil PCLs (TRRP Tier 1 residential $^{Tot}Soil_{Comb}$ PCLs for surface soils or $^{Air}Soil_{Inh\text{-}V}$ PCLs for subsurface soils). As such, no TRRP non-ingestion soil PCLE zones exist at the designated property.

Groundwater PCLE Zones

The May 2012 groundwater sampling and analysis results indicate detections of TCE, cis-1,2-DCE, and 1,1-dichloroethene (1,1-DCE) in the designated property's shallow groundwater in excess of their applicable TRRP Tier 1 groundwater ingestion PCLs (TRRP Tier 1 residential $^{GW}GW_{Ing}$ PCLs). The TCE daughter products (cis-1,2-DCE and 1,1-DCE) PCLE zones are completely within the TCE PCLE zone. Concentrations of methyl tert-butyl ether (MTBE) were previously detected above its TRRP Tier 1 residential $^{GW}GW_{Ing}$ PCL; however, MTBE has not been detected above its TRRP Tier 1 residential $^{GW}GW_{Ing}$ PCL since January 2012. Therefore, only three TRRP ingestion groundwater PCLE zones (TCE, cis-1,2-DCE, and 1,1-DCE) currently exist at the designated property. No COCs exceed the applicable TRRP Tier 1 residential non-ingestion groundwater PCLs, which correspond to the $^{Air}GW_{Inh\text{-}V}$ pathway.

Groundwater gauging data collected to date from monitoring wells installed in the designated property boundary indicate the flow of shallow groundwater is towards the south-southeast, from the 1708 State Street parcel towards the 1600 Memorial Drive parcel, as shown in ***Figure C.6***. There are no groundwater PCLE zones on the 1720 Memorial Drive parcel.

The location of the designated property's groundwater PCLE zones are shown on ***Figure C.8***. The groundwater analytical data and TRRP PCLs utilized for determination of the designated property's groundwater ingestion and non-ingestion PCLE zones are included in ***Table D.2***.

TCE, cis-1,2-DCE, and 1,1-DCE PCLE Zone

The most recent groundwater monitoring data indicates the existence of a TCE groundwater ingestion PCLE zone (TCE PCLE zone) in the uppermost GWBU of the designated property. The TCE PCLE zone encompasses approximately 120,000 SF and includes the following permanent groundwater monitoring wells:

1708 State Street parcel:

- Monitoring well TMW-3
- Monitoring well TMW-6
- Monitoring well TMW-7

1714/1716 Memorial Drive parcel:

- Monitoring well TMW-1
- Monitoring well TMW-4
- Monitoring well TMW-5

Off-Site:

- Monitoring well MW-9, located at 1600 State Street, adjacently east of the 1708 State Street parcel, owned by HPOU.

Within the TCE PCLE zone are two smaller cis-1,2-DCE and 1,1-DCE PCLE zones. The cis-1,2-DCE PCLE zone is located in the southeastern portion of the 1600 Memorial Drive parcel, centered on monitoring well TMW-5, and is approximately 400 SF. The 1,1-DCE PCLE zone is located along the southern portion of 1714/1716 Memorial Drive parcel and 1600 Memorial Drive parcel, contained within monitoring wells TMW-1 and TMW-5, and is approximately 4,300 SF. The TCE PCLE zone is delineated to the south by off-site monitoring wells MW-8 and MW-10, located within the COH Memorial Drive right-of-way. The TCE PCLE zone is delineated to the west by monitoring well TMW-2/MW-2, located on the 1714/1716 Memorial Drive parcel.

The current maximum TCE concentration of 2.6 mg/L was detected in a groundwater sample collected from monitoring well TMW-3 (located on the 1708 State Street parcel). The current maximum cis-1,2-DCE and 1,1-DCE concentrations of 0.70 mg/L and 0.054 mg/L, respectively, were detected in monitoring well TMW-5 (located on the 1600 Memorial Drive parcel).

None of the COCs detected in the groundwater at the 1714/1716 Memorial Drive parcel or 1600 Memorial Drive parcel of the designated property exceed their applicable TRRP non-ingestion groundwater PCLs (TRRP Tier 1 residential $^{Air}GW_{Inh\text{-}V}$ PCLs). As such, no TRRP non-ingestion groundwater PCLE zones exist at the designated property.

Geochemical Properties of COCs in Designated Soil and Groundwater

The COCs (PCE, TCE, cis-1,2-DCE, and1,1-DCE) detected in the soil and/or groundwater of the first GWBU on the designated property are chlorinated ethenes which result from historic, on-site, commercial activities (e.g., construction materials testing laboratory chemical storage and on-site vehicle maintenance). The chlorinated ethene COCs present in the soil and/or groundwater occur in the dissolved-phase and no direct evidence of non-aqueous phase liquids (NAPLs) has been observed or detected. Due to their high densities, NAPLs comprised of chlorinated ethenes are generally referred to as dense NAPLs or DNAPLs. DNAPL-phase COCs have a tendency to migrate vertically and "sink" in GWBUs. Typically, dissolved-phase chlorinated ethenes preferentially migrate with groundwater flow. However, DNAPLs, when

present, can migrate along the dip of geologic contacts. Monitoring wells installed at the subject property fully penetrate the GWBU, but no DNAPL-phase COCs have been observed.

Generally, chlorinated ethenes such as those detected in the soil and/or groundwater on the designated property are colorless liquids at room temperature. In addition, they are relatively volatile, have higher densities than water, relatively low viscosities, relatively low solubilities, and relatively low explosive limits.

TABLE D.1
SUMMARY OF SOIL ANALYTICAL RESULTS
CITY OF HOUSTON MUNICIPAL SETTING DESIGNATION
HOUSTON POLICE FEDERAL CREDIT UNION PROPERTY
1600/1714/1716/1720 MEMORIAL DRIVE AND 1708 STATE STREET
HOUSTON, HARRIS COUNTY, TEXAS

			VOCs								TPH				Metals							
Sample Name	Sample Depth (ft-bgs)	Sample Date	1,1,2-Trichloroethane	Acetone	Benzene	cis-1,2-Dichloroethene	Ethylbenzene	Methyl tert-butyl ether	Tetrachloroethene	Trichloroethene	C_6-C_{12}	C_{12}-C_{24}	C_{24}-C_{35}	TOTAL TPH	Arsenic	Barium	Cadmium	Chromium	Lead	Selenium	Silver	Mercury
			SW 8260B mg/Kg	SW 8260B mg/Kg	SW 8260B mg/Kg	SW 8260B mg/Kg	SW 8260B mg/Kg	SW 8260B mg/Kg	SW 8260B mg/Kg	SW 8260B mg/Kg	Method TX 1005 mg/Kg	Method TX 1005 mg/Kg	Method TX 1005 mg/Kg	Method TX 1005 mg/Kg	SW 6020 mg/Kg	SW 6020 mg/Kg	SW 6020 mg/Kg	SW 6020 mg/Kg	SW 6020 mg/Kg	SW 6020 mg/Kg	SW 6020 mg/Kg	SW 7471A mg/Kg
SOIL BORINGS																						
SB-1	0-2	9/9/2010	<0.00062	<0.0025	<0.00062	**1.2**	<0.00062	<0.00062	**0.20**	**2.0**	<19	<19	<19	<19	**1.20**	**17.2**	<0.038	**5.14**	**6.22**	**0.415 J**	<0.038	**0.0185 H**
SB-2	6-8	9/9/2010	<0.00058	**0.0080 J**	<0.00058	<0.00058	<0.00058	<0.00058	<0.00070	<0.00058	<19	<19	<19	<19	--	--	--	--	--	--	--	--
SB-3	4-6	9/9/2010	<0.00058	<0.0023	<0.00058	<0.00058	<0.00058	<0.00058	<0.00070	<0.00058	<19	<19	<19	<19	--	--	--	--	--	--	--	--
SB-4	2-4	9/9/2010	<0.00056	<0.0023	<0.00056	<0.00056	<0.00056	<0.00056	<0.00068	<0.00056	<18	<18	<18	<18	--	--	--	--	--	--	--	--
SB-5	2-4	9/9/2010	<0.00062	<0.0025	<0.00062	**0.020**	<0.00062	<0.00062	<0.00074	**0.087**	<19	<19	<19	<19	--	--	--	--	--	--	--	--
SB-6	4-6	9/9/2010	<0.00057	**0.014 J**	<0.00057	<0.00057	<0.00057	<0.00057	<0.00068	**0.048**	<18	<18	<18	<18	--	--	--	--	--	--	--	--
SB-7	1-2	10/12/2010	<0.00060	<0.0024	<0.00060	**0.0089**	<0.00060	<0.00060	<0.00071	**0.13**	<19	<19	**35 J**	**35.0 J**	--	--	--	--	--	--	--	--
SB-9	1-2	10/12/2010	<0.00063	<0.0025	<0.00063	<0.00063	<0.00063	<0.00063	<0.00076	**0.011**	<20	<20	<20	<20	--	--	--	--	--	--	--	--
MONITORING WELLS																						
TMW-1	2-4	9/9/10	<0.00064	<0.0025	<0.00064	<0.00064	<0.00064	<0.00064	<0.00076	<0.00064	<20	<20	<20	<20	--	--	--	--	--	--	--	--
	14-16		<0.00058	<0.0023	<0.00058	<0.00058	<0.00058	<0.00058	<0.00070	<0.00058	<18	<18	<18	<18	--	--	--	--	--	--	--	--
	23-24		<0.00058	<0.0023	<0.00058	<0.00058	<0.00058	<0.00058	<0.00069	<0.00058	<18	<18	<18	<18	--	--	--	--	--	--	--	--
TMW-2	0-2	9/9/10	<0.00058	<0.0023	<0.00058	<0.00058	<0.00058	<0.00058	<0.00070	<0.00058	<18	<18	<18	<18	--	--	--	--	--	--	--	--
	14-16		<0.00058	<0.0023	<0.00058	<0.00058	<0.00058	<0.00058	<0.00070	<0.00058	<19	<19	<19	<19	--	--	--	--	--	--	--	--
	22-24		<0.00060	<0.0024	<0.00060	<0.00060	<0.00060	<0.00060	<0.00073	<0.00060	<19	<19	<19	<19	--	--	--	--	--	--	--	--
TMW-3	4-6	9/9/10	**0.0036 J**	<0.0023	<0.00057	**0.0039 J**	<0.00057	<0.00057	<0.00068	**0.38**	<18	<18	<18	<18	--	--	--	--	--	--	--	--
	26-28		<0.00056	<0.0023	<0.00056	<0.00056	<0.00056	<0.00056	<0.00068	<0.00056	<18	<18	<18	<18	--	--	--	--	--	--	--	--
	31-32		<0.00057	<0.0023	<0.00057	<0.00057	<0.00057	<0.00057	<0.00068	<0.00057	<18	<18	<18	<18	--	--	--	--	--	--	--	--
TMW-4	6-8	10/11/2010	<0.00054	**0.0056 J**	<0.00054	<0.00054	<0.00054	<0.00054	<0.00065	<0.00054	<17	<17	<17	<17	--	--	--	--	--	--	--	--
TMW-6	4-6	8/24/2011	<0.0024	<0.0055	**0.0020 J**	<0.0018	**0.0013 J**	**0.0033 J**	<0.0012	**0.0023 J**	--	--	--	--	--	--	--	--	--	--	--	--
TMW-7	22-24	8/24/2011	<0.0025	<0.0057	**0.0010 J**	<0.0018	<0.0011	**0.0037 J**	<0.0012	<0.0020	--	--	--	--	--	--	--	--	--	--	--	--
MW-10	5-7.5	6/25/2012	<0.0020	<0.0046	-	<0.0015	-	-	<0.0010	<0.0016	--	--	--	--	--	--	--	--	--	--	--	--
REGULATORY STANDARDS																						
TCEQ TRRP Tier 1 $^{GW}Soil_{Ing}$ Residential Soil PCLs (0.5-Acre Source Area)			**0.02**	**43**	**0.026**	**0.25**	**7.6**	**0.62**	**0.05**	**0.034**	**65**	**200**	**200**	**-**	**5.0**	**440**	**1.5**	**2,400**	**3.0**	**2.3**	**0.48**	**0.0078**
TRRP Texas-Specific Soil Background Concentrations			**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**5.9**	**300**	**-**	**30**	**15**	**0.3**	**-**	**0.04**
TCEQ TRRP Tier 1 $^{Tot}Soil_{Comb}$ Residential Soil PCLs (0.5-Acre Source Area)			**18**	**66,000**	**120**	**140**	**6,400**	**800**	**450**	**18**	**1,600**	**2,300**	**2,300**	**-**	**24**	**8,100**	**52**	**3,300**	**500**	**310**	**97**	**3.6**

NOTES:
"-" Indicates Not Applicable.
"--" Indicates Not Analyzed.
"ft-bgs" indicates feet below ground surface
"H" indicates a sample was analyzed outside of hold time.
"mg/Kg" indicates milligrams per kilogram
"<0.006" indicates a concentration less than the laboratory Sample Detection Limit (SDL)
"J" indicates that the target analyte was positively identified below the Method Quantitation Limit (MQL) and above the SDL
Only VOC analytes with at least one sample with a concentration above the laboratory reporting limit are shown on this table.
Concentrations in bold exhibit a concentration in excess of the laboratory SDL.
Concentrations in bold and highlighted exhibit a concentration in excess of the laboratory SDL and the TRRP Tier 1 Residential Protective Concentration Limit (PCL) (yellow) or TRRP Tier 1 Commerical PCL (orange).
TCEQ TRRP Tier 1 Commercial/Industrial PCLs (30 TAC 350) Table 3: Tier 1 Commercial/Industrial Soil PCLs Dated June 2012.

TABLE D.2
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS
HOUSTON POLICE FEDERAL CREDIT UNION PROPERTY
1600/1714/1716/1720 MEMORIAL DRIVE AND 1708 STATE STREET
HOUSTON, HARRIS COUNTY, TEXAS

		VOCs													TPH			
Sample Name	**Sample Date**	**1,1-Dichloroethane**	**1,1-Dichloroethene**	**1,1,2-Trichloroethane**	**Acetone**	**Bromodichloromethane**	**Chloroform**	**cis-1,2-Dichloroethene**	**Dibromochloromethane**	**Methyl tert-butyl ether**	**Tetrachloroethene**	**Trans-1,2-Dichloroethene**	**Trichloroethene**	**Vinyl Chloride**	**C_6-C_{12}**	**C_{12}-C_{28}**	**C_{28}-C_{35}**	**TOTAL TPH**
		SW 8260B mg/L	SW 8260B mg/L	SW 8260B mg/L	SW 8260B mg/L	SW 8260B mg/L	SW 8260B mg/L	SW 8260B mg/L	SW 8260B mg/L	SW 8260B mg/L	SW 8260B mg/L	SW 8260B mg/L	SW 8260B mg/L	SW 8260B mg/L	Method TX 1005 mg/L	Method TX 1005 mg/L	Method TX 1005 mg/L	Method TX 1005 mg/L
MONITORING WELLS																		
TMW-1	9/10/10	<0.00050	<0.00050	<0.00050	**0.0034 J**	<0.00050	<0.00050	<0.00050	<0.00050	**0.023**	<0.00060	<0.00050	**0.0016 J**	<0.00050	<0.19	<0.19	<0.19	<0.19
	10/11/10	<0.00050	<0.00050	<0.00050	<0.0010	<0.00050	<0.00050	<0.00050	<0.00050	**0.066**	<0.00060	<0.00050	**0.0040 J**	<0.00050	<0.19	<0.19	<0.19	<0.19
	8/24/11	<0.0011	**0.0037 J**	<0.00080	<0.0040	<0.0014	<0.0010	**0.0030 J**	<0.00090	**0.67**	<0.0017	<0.0010	**0.059**	<0.0010	--	--	--	--
	1/16/12	**0.0017 J**	**0.021**	<0.00080	<0.0040	--	**0.0015 J**	**0.024**	<0.00090	**0.47**	**0.0024 J**	<0.0010	**0.26**	< 0.0010	--	--	--	--
	5/22/12	**0.0018 J**	**0.015**	<0.00080	<0.0040	--	**0.0012 J**	**0.026**	<0.00090	**0.040**	**0.0022 J**	<0.0010	**0.19**	<0.0010	--	--	--	--
TMW-2 / MW-2	9/10/10	<0.00050	<0.00050	<0.00050	<0.0010	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00060	<0.00050	**0.0036 J**	<0.00050	<0.19	<0.19	<0.19	<0.19
	10/11/10	<0.00050	<0.00050	<0.00050	<0.0010	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00060	<0.00050	**0.00056 J**	<0.00050	<0.19	<0.19	<0.19	<0.19
	9/2/11	<0.0011	<0.0013	<0.00080	<0.0040	**0.0046 J**	**0.0044 J**	<0.0025	**0.0029 J**	<0.0012	<0.0017	<0.0010	**0.0017 J**	<0.0010	--	--	--	--
	1/18/12	<0.0011	<0.0013	<0.00080	<0.0040	**--**	<0.0010	<0.0025	<0.00090	<0.0012	<0.0017	<0.0010	<0.0011	<0.0010	--	--	--	--
	5/21/12	<0.0011	<0.0013	<0.00080	<0.0040	**--**	<0.0010	<0.0025	<0.00090	<0.0012	<0.0017	<0.0010	<0.0011	<0.0010	--	--	--	--
TMW-3	9/10/10	<0.00050	**0.0017 J**	**0.0011 J**	<0.0010	<0.00050	**0.00093 J**	**0.013**	<0.00050	<0.00050	<0.00060	<0.00050	**1.9**	<0.00050	**0.70**	<0.19	<0.19	**0.700**
	10/11/10	<0.00050	**0.0023 J**	<0.00050	<0.0010	<0.00050	<0.00050	**0.0045 J**	<0.00050	<0.00050	<0.00060	<0.00050	**1.4**	<0.00050	**0.47**	<0.18	<0.18	**0.470**
	8/25/11	<0.0011	**0.0014 J**	<0.00080	<0.0040	<0.00090	<0.0010	**0.0037 J**	<0.00090	<0.0012	<0.0017	<0.0010	**1.3**	<0.0010	**--**	--	--	**--**
	1/17/12	<0.0011	**0.0017 J**	<0.00080	<0.0040	--	<0.0010	**0.0044 J**	<0.00090	<0.0012	<0.0017	<0.0010	**2.6**	<0.0010	--	--	--	--
	5/21/12	<0.0011	**0.0016 J**	<0.00080	<0.0040	--	<0.0010	**0.0057**	<0.00090	<0.0012	<0.0017	<0.0010	**2.6**	<0.0010	--	--	--	--
TMW-4	10/11/10	<0.00050	**0.0037 J**	<0.00050	<0.0010	<0.00050	**0.0021 J**	**0.013**	<0.00050	<0.00050	<0.00060	<0.00050	**0.31**	<0.00050	<0.19	<0.19	<0.19	<0.19
	8/25/11	<0.0011	**0.0018 J**	<0.00080	<0.0040	<0.00090	<0.0010	**0.0065**	<0.00090	<0.0012	<0.0017	<0.0010	**0.59**	<0.0010	--	--	--	--
	1/17/12	<0.0011	<0.0013	<0.00080	<0.0040	--	<0.0010	**0.0043 J**	<0.00090	<0.0012	<0.0017	<0.0010	**0.53**	<0.0010	--	--	--	--
	5/22/12	<0.0011	<0.0013	<0.00080	<0.0040	--	<0.0010	**0.0054**	<0.00091	<0.0012	<0.0017	<0.0010	**0.42**	<0.0010	--	--	--	--
TMW-5	8/25/11	**0.0046 J**	**0.028**	<0.00080	<0.0040	<0.00090	<0.0010	**0.18**	<0.00090	<0.0012	<0.0017	**0.0010 J**	**0.090**	<0.0010	--	--	--	--
	1/16/12	**0.0077**	**0.049**	<0.00080	<0.0040	--	<0.0010	**0.70**	<0.00090	<0.0012	<0.0017	**0.0032 J**	**0.12**	**0.0014 J**	--	--	--	--
	5/22/12	**0.0080**	**0.054**	<0.00080	<0.0040	--	<0.0010	**0.70**	<0.00090	<0.0012	<0.0017	**0.0041 J**	**0.066**	**0.0018 J**	--	--	--	--
TMW-6	8/25/11	<0.0011	<0.0013	<0.00080	<0.0040	<0.00090	<0.0010	<0.0025	<0.00090	<0.0012	<0.0017	<0.0010	**0.0078**	<0.0010	--	--	--	--
	1/16/12	<0.0011	<0.0013	<0.00080	<0.0040	--	<0.0010	<0.0025	< 0.00090	<0.0012	<0.0017	<0.0010	**0.0037 J**	<0.0010	--	--	--	--
	5/21/12	<0.0011	<0.0013	<0.00080	<0.0040	--	<0.0010	<0.0025	<0.00090	<0.0012	<0.0017	<0.0010	**0.0068**	<0.0010	--	--	--	--
TMW-7	8/25/11	<0.0011	**0.0023 J**	<0.00080	<0.0040	<0.00090	<0.0010	**0.0047 J**	<0.00090	<0.0012	<0.0017	<0.0010	**1.4**	<0.0010	--	--	--	--
	1/17/12	<0.0011	**0.0033 J**	<0.00080	<0.0040	--	<0.0010	**0.0056**	<0.00090	<0.0012	<0.0017	<0.0010	**2.2**	<0.0010	--	--	--	--
	5/23/12	<0.0010	**0.0024 J**	<0.00080	<0.0040	--	<0.0010	**0.0041 J**	--	<0.0012	<0.0017	<0.0010	**1.6**	<0.0010	--	--	--	--
MW-8	1/18/12	<0.0011	<0.0013	<0.00080	<0.0040	--	<0.0010	<0.0025	<0.00090	<0.0012	<0.0017	<0.0010	<0.0011	<0.0010	--	--	--	--
	2/16/12	<0.0011	<0.0013	<0.00080	<0.0040	--	<0.0010	<0.0025	<0.00090	<0.0012	<0.0017	<0.0010	<0.0011	<0.0010	--	--	--	--
	5/23/12	<0.0011	<0.0013	<0.00080	<0.0040	--	<0.0010	<0.0025	--	<0.0012	<0.0017	<0.0010	<0.0011	<0.0010	--	--	--	--
MW-9	1/18/12	<0.0011	<0.0013	<0.00080	<0.0040	--	<0.0010	<0.0025	<0.00090	<0.0012	<0.0017	<0.0010	**0.020**	<0.0010	--	--	--	--
	2/16/12	<0.0011	<0.0013	<0.00080	<0.0040	--	<0.0010	<0.0025	<0.00090	<0.0012	<0.0017	<0.0010	**0.012**	<0.0010	--	--	--	--
	5/23/12	<0.0011	<0.0013	<0.00080	<0.0040	--	<0.0010	<0.0025	--	<0.0012	<0.0017	<0.0010	**0.0089**	<0.0010	--	--	--	--
MW-10	6/25/12	<0.0011	<0.0013	<0.00080	<0.0040	--	<0.0010	<0.0025	<0.00090	--	<0.0017	<0.0010	<0.0011	<0.0010	--	--	--	--
REGULATORY STANDARDS																		
TCEQ TRRP Tier 1 $^{GW}GW_{Ing}$ Residential Groundwater PCLs		**4.9**	**0.0070**	**0.005**	**22**	**0.015**	**0.24**	**0.07**	**0.011**	**0.24**	**0.005**	**0.10**	**0.005**	**0.002**	**0.98**	**0.98**	**0.98**	**-**
TCEQ TRRP Tier 1 $^{Air}GW_{Inh-V}$ Residential Groundwater PCLs		**43,000**	**1,700**	**80**	**1,000,000**	**-**	**20**	**1,200**	**-**	**4,000**	**500**	**770**	**240**	**3.8**	**1,800**	**7,500**	**7,500**	**-**

NOTES:
Only VOC analytes with at least one sample with a concentration above the laboratory reporting limit are shown on this table.
"-" indicates Not Applicable.
"--" indicates Not Analyzed.
"mg/L" indicates milligrams per liter.
"<0.00050" indicates a concentration less than the laboratory Sample Detection Limit (SDL).
"J" indicates that the target analyte was positively identified below the Method Quantitation Limit (MQL) and above the SDL.
Concentrations in bold exhibit a concentration in excess of the laboratory SDL.
Concentrations in bold and highlighted exhibit a concentration in excess of the laboratory SDL and the TRRP Tier 1 Residential Protective Concentration Limit (PCL) (yellow) or TRRP Tier 1 Commerical PCL (orange).
TCEQ TRRP Tier 1 Commercial/Industrial PCLs (30 TAC 350) Table 3: Tier 1 Commercial/Industrial Groundwater PCLs Dated June 2012.
TMW-2 was silted in and plugged and abandoned. Monitoring well MW-2 was installed as a replacement well.

Appendix E – COCs in Designated Groundwater

As previously discussed and documented in ***Appendix D***, groundwater sampling and analysis activities performed to date on the designated property indicate the groundwater currently contains concentrations of three COCs that exceed the TRRP ingestion PCLs: TCE, cis-1,2-DCE, and 1,1-DCE. A brief summary discussion regarding the COCs present in the groundwater of the designated property follows. A more detailed discussion of the COCs and their associated groundwater PCLE zones is provided in ***Appendix D***. Maps showing the current locations and concentrations of COCs in the designated property's groundwater are provided in ***Appendix C*** and summary tables of all groundwater sampling and analysis results obtained for the designated property are provided in ***Appendix D*** as ***Table D.2***.

Ingestion PCLE Zone in Designated Groundwater

Groundwater sampling and analysis activities performed to date on the designated property indicate the groundwater of the designated property currently contains detectable concentrations of nine VOC COCs. The COCs occur in the dissolved-phase and no direct or indirect evidence of NAPLs has been observed or detected. Of the nine VOC COCs detected on the designated property, three (TCE, cis-1,2-DCE, and 1,1-DCE) are currently present in excess of the COCs' applicable TRRP groundwater ingestion PCLs (TRRP Tier 1 residential $^{GW}GW_{Ing}$ PCLs). The current and historic maximum concentration of TCE was detected in monitoring well TMW-3, located in the southwestern portion of the 1708 State Street parcel (currently enrolled in the TCEQ as VCP No. 2427). The current and historic maximum concentrations of 1,1-DCE, cis-1,2-DCE, were detected in monitoring well TMW-5 located on the southern portion of the 1600 Memorial Drive parcel. The cis-1,2-DCE and 1,1-DCE PCLE zones are fully contained within the TCE PCLE zone. As discussed in ***Appendix D***, the TCE groundwater ingestion PCLE zone is delineated to the west by monitoring well TMW-2/MW-2 (located on the 1714/1716 Memorial Drive parcel) and downgradient to the south by off-site monitoring wells MW-8 and MW-10 (located in the COH Memorial Drive right-of-way).

Non-Ingestion PCLE Zone in Designated Groundwater

No concentrations of any COCs have been detected in the groundwater of the designated property in excess of applicable TRRP non-ingestion PCLs. As such, no TRRP non-ingestion groundwater PCLE zones exist in connection with the designated property.

Geochemical Properties of COCs in Designated Groundwater

The groundwater COCs (TCE, cis-1,2-DCE, and 1,1-DCE) are chlorinated ethenes which occur in the dissolved-phase and no direct evidence of NAPLs has been observed or detected. Due to their high densities (greater than water), NAPLs comprised of chlorinated ethenes are generally referred to as dense NAPLs or DNAPLs. DNAPL-phase COCs have a tendency to migrate vertically and "sink" in GWBUs. Typically, dissolved-phase chlorinated ethenes preferentially migrate with groundwater flow. However, DNAPLs, when present, can migrate along the dip of geologic contacts counter to groundwater flow. No DNAPL-phase COCs have been observed at the monitoring wells installed at the designated property.

Generally, chlorinated ethenes such as those detected in the groundwater at the designated property are colorless liquids at room temperature. In addition, they are relatively volatile, have higher densities than water, relatively low viscosities, relatively low solubilities, and relatively low explosive limits.

Appendix F – Summary of Soil and Groundwater Data

As previously discussed and detailed in ***Appendix D*** and ***Appendix E***, soil sampling and analysis activities performed to date have revealed tetrachloroethene (PCE), trichloroethene (TCE), and cis-1,2-dichloroethene (cis-1,2-DCE) to be present in excess of the TRRP soil-to-groundwater ingestion PCLs. Groundwater sampling and analysis activities performed to date have revealed historic concentrations of TCE, cis-1,2-DCE, 1,1-dichloroethene (1,1-DCE), and methyl tert-butyl ether (MTBE) to be present in excess of the TRRP groundwater ingestion PCLs. However, recent analytical testing indicates concentrations of MTBE in groundwater are below their TRRP groundwater ingestion PCL. Summary tables showing the maximum concentrations of the COCs detected in soil and groundwater in the vicinity of the designated property since assessment activities began in 2010 are provided in ***Tables F.1*** and ***F.2***. Included with the maximum COC concentrations in ***Tables F.1*** and ***F.2*** are the COC's applicable TRRP PCLs for both ingestion and non-ingestion exposure pathways. The locations of all soil and groundwater sampling points are presented on ***Figure C.5***

Only three COCs (TCE, cis-1,2-DCE, and 1,1-DCE) in groundwater at the designated property currently exceed their respective TRRP groundwater ingestion PCLs (the critical TRRP PCLs without an MSD). However, no COCs in soil or groundwater currently exceed their respective TRRP non-ingestion PCLs (critical TRRP PCLs with an MSD).

TABLE F.1
SUMMARY OF MAXIMUM SOIL CONCENTRATIONS
MUNICIPAL SETTING DESIGNATION APPLICATION
PROFESSIONAL SERVICE INDUSTRIES, INC. PROPERTY
1600/1714/1716/1720 MEMORIAL DRIVE AND 1708 STATE STREET
HOUSTON, HARRIS COUNTY, TEXAS

CHEMICAL OF CONCERN	MAXIMUM SOIL CONCENTRATION				CRITICAL TRRP TIER 1 RESIDENTIALSOIL PROTECTIVE CONCENTRATION LEVEL	
	Sample ID	Sample Depth	Sample Date	Detected Concentration (mg/kg)	Ingestion PCL (Without MSD)	Non-Ingestion PCL (With MSD)
					$^{GW}Soil_{Ing}$ (mg/kg)	$^{Tot}Soil_{Comb}$ (mg/kg)
Tetrachloroethene	SB-1	0-2	9/9/10	**0.20**	**0.05**	**100**
Trichloroethene	SB-1	0-2	9/9/10	**2.0**	**0.034**	**120**
cis-1,2-Dichloroethene	SB-1	0-2	9/9/10	**1.2**	**0.25**	**140**

NOTE:
COCs highlighted in yellow exceed the critical TRRP Tier 1 Residential Soil PCL (applicable TRRP Tier 1 Residential Soil Ingestion PCL) without an MSD; but do not exceed the critical TRRP Tier 1 Residential Soil PCL (applicable TRRP Tier 1 Residential Soil Non-Ingestion PCL) with an MSD.

TABLE F.2
SUMMARY OF MAXIMUM GROUNDWATER CONCENTRATIONS
MUNICIPAL SETTING DESIGNATION APPLICATION
PROFESSIONAL SERVICE INDUSTRIES, INC. PROPERTY
1600/1714/1716/1720 MEMORIAL DRIVE AND 1708 STATE STREET
HOUSTON, HARRIS COUNTY, TEXAS

CHEMICAL OF CONCERN	GROUNDWATER-BEARING UNIT	CURRENT MAXIMUM GROUNDWATER CONCENTRATION			CRITICAL TRRP TIER 1 RESIDENTIALGROUNDWATER PROTECTIVE CONCENTRATION LEVEL	
		Sample ID	Sample Date	Detected Concentration (mg/kg)	Ingestion PCL (Without MSD)	Non-Ingestion PCL (With MSD)
					$^{GW}GW_{Ing}$ (mg/L)	$^{Air}GW_{Inh-V}$ (mg/L)
Tetrachloroethene	First	TMW-1	1/16/12	**0.0024 J**	**0.005**	**500**
Trichloroethene	First	TMW-3	5/21/12	**2.6**	**0.005**	**120**
cis-1,2-Dichloroethene	First	TMW-5	5/21/12	**0.70**	**0.07**	**1,200**
1,1-Dichloroethene	First	TMW-5	5/21/12	**0.054**	**0.0070**	**1,700**
Methyl tert-butyl ether	First	TMW-1	8/24/11	**0.67**	**0.24**	**4,000**

NOTE:
COCs highlighted in yellow exceed the critical TRRP Tier 1 Residential Groundwater PCL (applicable TRRP Tier 1 Residential Groundwater Ingestion PCL) without an MSD; but do not exceed the critical TRRP Tier 1 Residential Groundwater PCL (applicable TRRP Tier 1 Residential Groundwater Non-Ingestion PCL) with an MSD.

Appendix G – Plume Stability

Soil and groundwater assessments and monitoring activities performed to date on the designated property have identified two distinct soil contaminant plumes and a groundwater contaminant plume on the designated property. The soil contaminant plumes (PCE, TCE, and cis-1,2-DCE) are located on the 1708 State Street parcel and 1714/1716 Memorial Drive parcel, within the boundaries of VCP No. 2427. There are no soil PCLE zones on the 1720 Memorial Drive parcel and 1600 Memorial Drive parcel. The groundwater contaminant plume (TCE, cis-1,2-DCE, and 1,1-DCE) extends from the 1708 State Street parcel across the designated property and off-site, to the east (1600 State Street) and to the south (COH Memorial Drive right-of-way). Monitoring well TMW-1 located along the southern property boundary of the 1714/1716 Memorial Drive parcel exhibited historic detections of methyl tert-butyl ether (MTBE) in excess of the applicable TRRP groundwater ingestion PCLs. None of the groundwater samples collected on the designated property since January 2012 have exhibited detections of MTBE in excess of its applicable TRRP groundwater ingestion PCLs. There is no groundwater PCLE zone on the 1720 Memorial Drive parcel. The following sections provide discussions regarding the stability of each of the designated property's contaminant plumes.

Soil Plume

Assessment activities performed to date indicated detections of PCE, TCE, and cis-1,2-DCE PCLs in excess of the applicable TRRP soil-to-groundwater ingestion (TRRP Tier 1 residential $^{GW}Soil_{Ing}$ PCLs) located on the 1708 State Street parcel and the 1714/1716 Memorial Drive parcel. The soil PCLE zones are horizontally delineated within the boundaries of the designated property.

1708 State Street parcel

Based on the results of the soil sampling activities, a TCE soil-to-groundwater ingestion PCLE zone is located in the western portion of the 1708 State Street parcel, located in proximity of a former hazardous chemical storage area, at a depth of 1 to 6 ft-bgs (see ***Figure C.7***). The TCE PCLE zone is horizontally delineated by monitoring well TMW-6 to the north; soil boring SB-9 to the west; and monitoring well TMW-4 to the south. Therefore the soil TCE PCLE zone is fully located with the boundaries of the designated property. Impacts to groundwater in the vicinity of this soil PCLE zone have been observed in monitoring wells TMW-3, TMW-6, and TMW-7. However, the 1708 State Street parcel is currently unoccupied and there is no current source on the designated property.

1714/1716 Memorial Drive parcel

Based on the results of the soil sampling activities, a TCE soil-to-groundwater ingestion PCLE zone is located on the northern portion of the 1714/1716 Memorial Drive parcel, located in proximity of former on-site vehicle maintenance activities, at depths from the surface to 3 ft-bgs (see ***Figure C.7***). The TCE PCLE zone consists of soil boring SB-1 and SB-5. Smaller PCE and cis-1,2-DCE PCLE zones are located within the TCE PCLE zone, centered on soil boring SB-1. The TCE PCLE zone is horizontally delineated to the north by soil borings SB-3 and SB-

4; to the south by monitoring well TMW-1; and to the west by soil boring SB-2 and monitoring well TMW-2/MW-2. Impacts to groundwater in the vicinity of this soil PCLE zone have been observed in monitoring wells TMW-7 and TMW-1. However, the 1714/1716 Memorial Drive parcel is currently unoccupied and no current sources exist on this parcel of the designated property.

Former MTBE Groundwater Plume

Groundwater sampling and analysis results obtained from monitoring well TMW-1 installed along the southern property boundary of the 1714/1716 Memorial Drive parcel indicate that the groundwater was historically impacted by MTBE above its respective TRRP groundwater ingestion PCL. However, the MTBE exceedance was observed during only two groundwater monitoring events, was decreasing in magnitude, and was limited to monitoring well TMW-1. The most recent groundwater monitoring event in May 2012 did not exhibit detections of MTBE above the applicable TRRP groundwater ingestion PCLs. In addition, none of the other monitoring wells on the designated property exhibited detections of MTBE above the sample detection limit.

TCE, cis-1,2-DCE, and 1,1-DCE Groundwater Plume

Assessment activities have revealed a chlorinated ethene plume that has adversely impacted groundwater on the designated property. Groundwater analytical results indicate concentrations of TCE, cis-1,2-DCE, and 1,1-DCE in excess of their respective TRRP groundwater ingestion PCLs (TRRP Tier 1 Residential $^{GW}GW_{Ing}$ PCLs). The TCE PCLE zone extends across the designated property and smaller cis-1,2-DCE and 1,1-DCE PCLE zones are located within the TCE PCLE zone. These COCs in groundwater result from historic operations conducted on the western portion of the designated property (the 1708 State Street parcel and the 1714/1716 Memorial Drive parcel).

The source area of the groundwater TCE PCLE plume appears to be in the southern portion of the 1708 State Street parcel, in the vicinity of monitoring wells TMW-3 and TMW-7. The TCE PCLE zone extends to the southeast across the 1600 Memorial Drive parcel and to the east across 1600 State Street (off-site). The most recent groundwater sampling analytical data indicates detectable concentrations of TCE in monitoring wells TMW-1, TMW-3, TMW-4, TMW-5, TMW-6, TMW-7, and MW-9 in excess of the TRRP Tier 1 groundwater PCLs. As seen in a graph of May 2012 data utilizing monitoring wells parallel to the longitudinal axis of the plume (***Graph G.1***), the concentrations of TCE are the highest at monitoring well TMW-3, indicating that monitoring well TMW-3 may be relatively near the source area. Upgradient monitoring well TMW-6 has much lower concentrations of TCE than monitoring well TMW-3. The concentrations of TCE decrease to below detectable levels at downgradient wells MW-8 and MW-10, located off-site within COH Memorial Drive right-of-way. The concentrations of the TCE daughter products (cis-1,2-DCE and 1,1-DCE) are the highest near the edge of the TCE plume, indicating that natural attenuation is likely occurring on the periphery of the TCE plume. The cis-1,2-DCE PCLE zone is found in monitoring well TMW-5 located on the southern boundary of the 1600 Memorial Drive parcel. The 1,1-DCE PCLE zone is located along the southern

boundary of the 1714/1716 Memorial Drive parcel and the 1600 Memorial Drive parcel, within monitoring wells TMW-1 and TMW-5. No other well exhibited detectable concentrations of cis-1,2-DCE and 1,1-DCE in excess of their respective TRRP Tier 1 groundwater PCLs.

In summary, COCs have not been detected in groundwater samples from the most downgradient monitoring wells (MW-8 and MW-10), located off-site within the COH Memorial Drive right-of-way. In addition, the presence of daughter products, cis-1,2-DCE in monitoring well TMW-5 and 1,1-DCE in monitoring wells TMW-1 and TMW-5, indicate that degradation of the TCE plume is occurring. The TCE plume is stable, decreasing in a downgradient direction, and delineated to the residential assessment level.

GRAPH G.1
TRICHLOROETHENE AND DAUGHTER PRODUCT GROUNDWATER CONCENTRATIONS - MAY 2012
HOUSTON POLICE FEDERAL CREDIT UNION PROPERTY
1600/1714/1716/1720 MEMORIAL DRIVE AND 1708 STATE STREET
HOUSTON, HARRIS COUNTY, TEXAS