

Additional Owner List
(Cont'd from pg. 2)

Owner: _____

Owner Address: _____
(Street) (City) (State) (Zip)

Name of Contact: _____

Title: _____

Organization: _____

Phone No.: _____ Fax No.: _____

Email: _____

Owner: _____

Owner Address: _____
(Street) (City) (State) (Zip)

Name of Contact: _____

Title: _____

Organization: _____

Phone No.: _____ Fax No.: _____

Email: _____

Owner: _____

Owner Address: _____
(Street) (City) (State) (Zip)

Name of Contact: _____

Title: _____

Organization: _____

Phone No.: _____ Fax No.: _____

Email: _____

Owner: _____

Owner Address: _____
(Street) (City) (State) (Zip)

Name of Contact: _____

Title: _____

Organization: _____

Phone No.: _____ Fax No.: _____

Email: _____

Appendix B

Figures and Site Maps

Item 2: A site map showing:**a. The location of the designated property.**

The property location is shown in **Figure B-1**.

b. The topography of the designated property as indicated on publicly available sources, which must note the watershed and whether the designated property is located in a floodplain or floodway, as those terms are defined in Chapter 19 of the Code.

The topography of the designated property is shown in **Figure B-2**. The designated property is not located in a floodplain or floodway as shown in **Figure B-3**. The property is located in the Brays Bayou watershed as shown in **Figure B-4**.

c. The detected area of groundwater contamination.

Figure B-5 depicts the area containing detectable constituent concentrations.

d. The location of all the soil sampling locations and all groundwater monitoring wells.

Soil and groundwater sampling locations are shown on **Figure B-6**.

e. Groundwater gradients, to the extent known, and direction of groundwater flow.

Figure B-7 shows the groundwater gradient in the water-bearing zone and indicates groundwater flow is generally toward the north and northwest.

f. The ingestion protective concentration level exceedance zone for each contaminant of concern, to the extent known.

Figures B-8, B-9, B-10 and B-11 show the ingestion protective concentration level exceedance zones (IPCLEZ) in the upper water-bearing zone for the five COCs – tetrachlorethene (PCE), trichloroethene (TCE), cis-1,2-dichloroethene (cis-1,2-DCE) and vinyl chloride (VC), respectively – at the site. A map is also provided as **B-12** that shows the IPCLEZ for benzene. However it is important to note that benzene is not a constituent of concern associated with historical dry cleaning operations at the site and appears to have originated from an off-site source.

DRAWN BY: WCV, CHECKED BY: JB, PROJECT MANAGER: GW
G:\ENCL\ent\Landmark Shopping Center\Municipal Setting Designation (MSD)\Report\Figures\FigB1-SiteMap.dwg PLOTTED: 3/6/2012 9:08 AM BY: PITTS, JENNY



LEGEND

 PROPERTY BOUNDARY

0 25' 50' 100'
SCALE: 1" = 200'

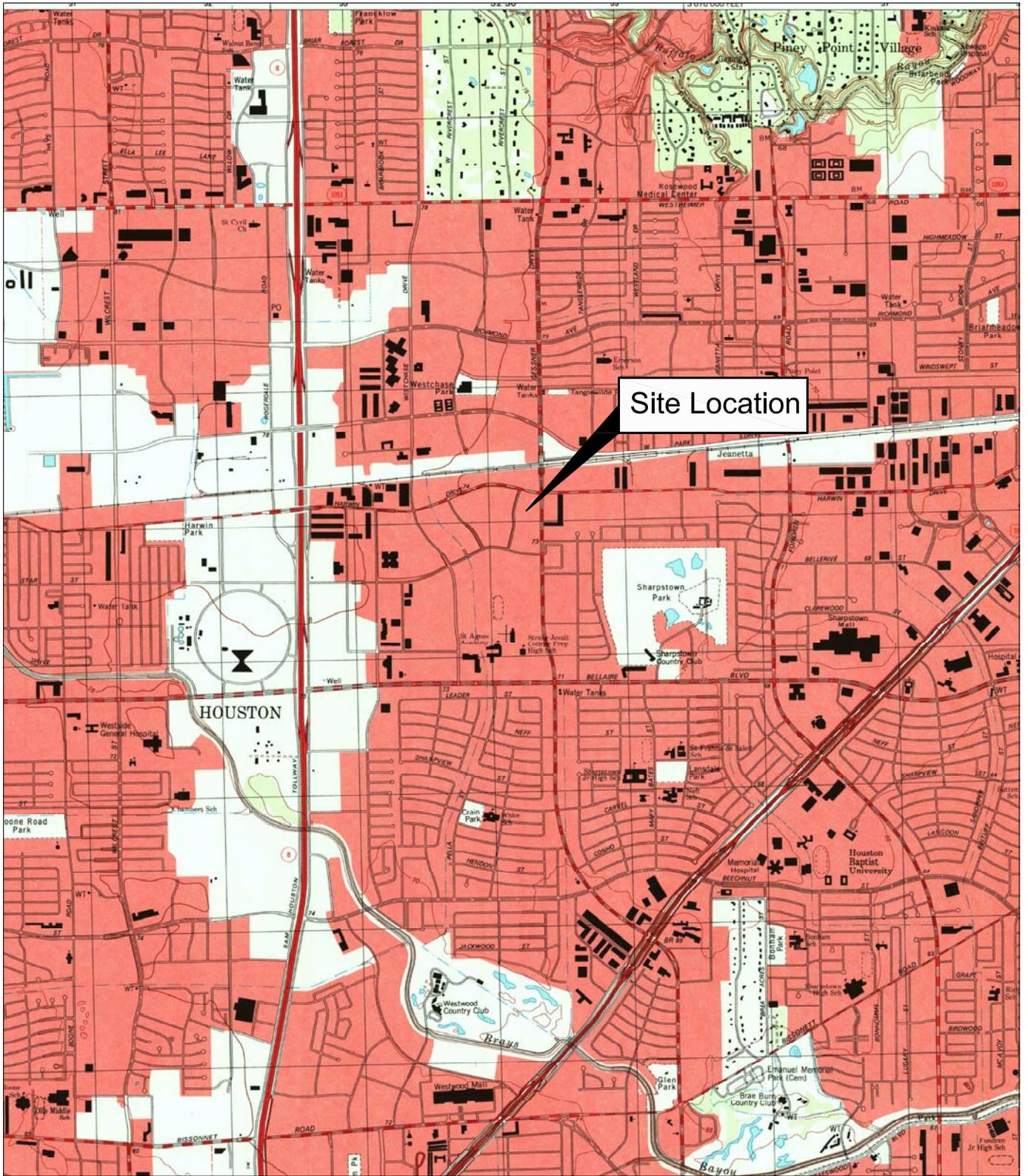
LANDMARK SHOPPING CENTER
5858 SOUTH GESSNER
HOUSTON, TEXAS
MUNICIPAL SETTING DESIGNATION APPLICATION

SITE MAP



FIGURE
B1

CITY:\r(Recd) DIV\GROUP\Recd DB\Recd) PM\Recd) PIC\Opt) LDI\Opt) LVR\Opt\ION\=OFF=REF" LAYOUT; LAYOUT1; SAVED: 3/6/2012 9:09 AM ACADVER: 18.1; S (LMS TECH) PAGESETUP; -- PLOTTED: 3/6/2012 8:10 AM BY: PITTS, JENNY



Scale: 1:24,000

Source: U.S.G.S 7.5 Minute Topographic Series Map, Alief, Texas Quadrangle, 1995.

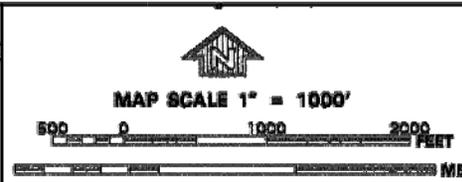
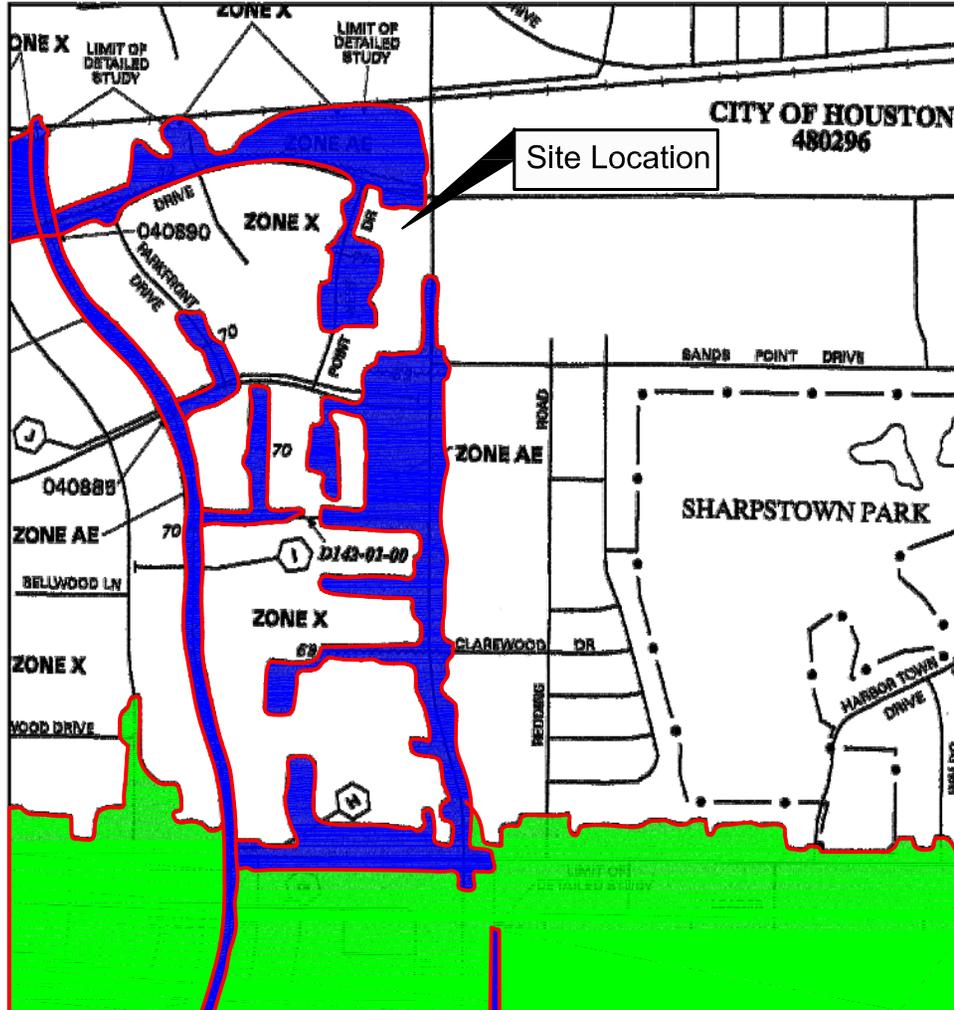


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MUNICIPAL SETTING DESIGNATION APPLICATION

TOPOGRAPHIC MAP



FIGURE
B2



PANEL 0835L

FIRM
FLOOD INSURANCE RATE MAP
 HARRIS COUNTY,
 TEXAS
 AND INCORPORATED AREAS

PANEL 835 OF 1160

THIS MAP INDEX FOR FIRM PANEL LAYOUT

DATE: 06/18/07

DATE	BY	REVISION
06/18/07	J. JENSEN	1


MAP NUMBER
 48201C0835L
MAP REVISED:
 JUNE 18, 2007

Federal Emergency Management Agency

LEGEND:

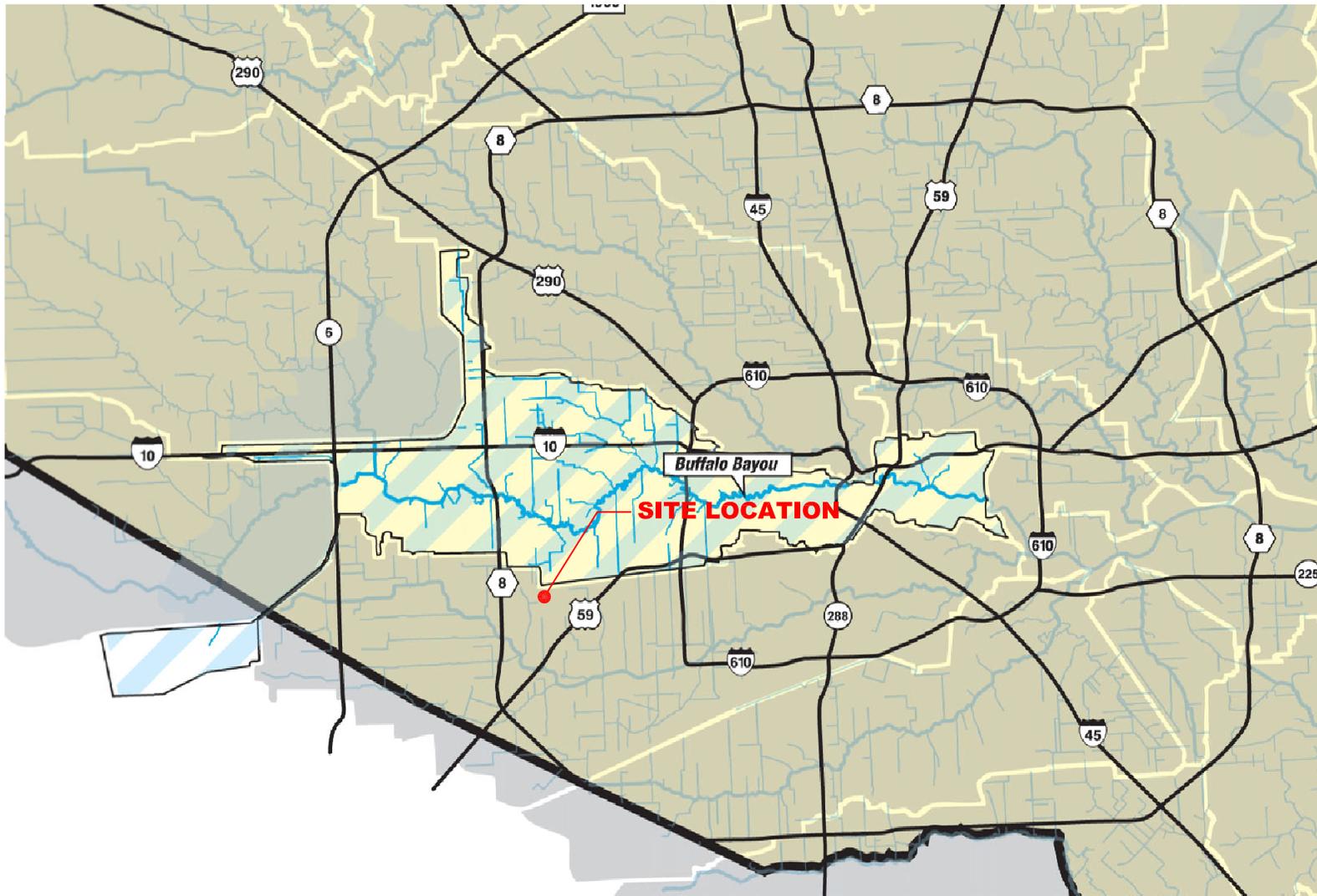
-  FLOODWAY AREAS IN ZONE AE MUST BE KEPT CLEAR FOR 100 YEAR FLOOD
-  OTHER FLOOD AREAS (ZONE X) IN THE 500 YEAR FLOOD AREA

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FLOODPLAIN MAP



FIGURE
B3



NOT TO SCALE

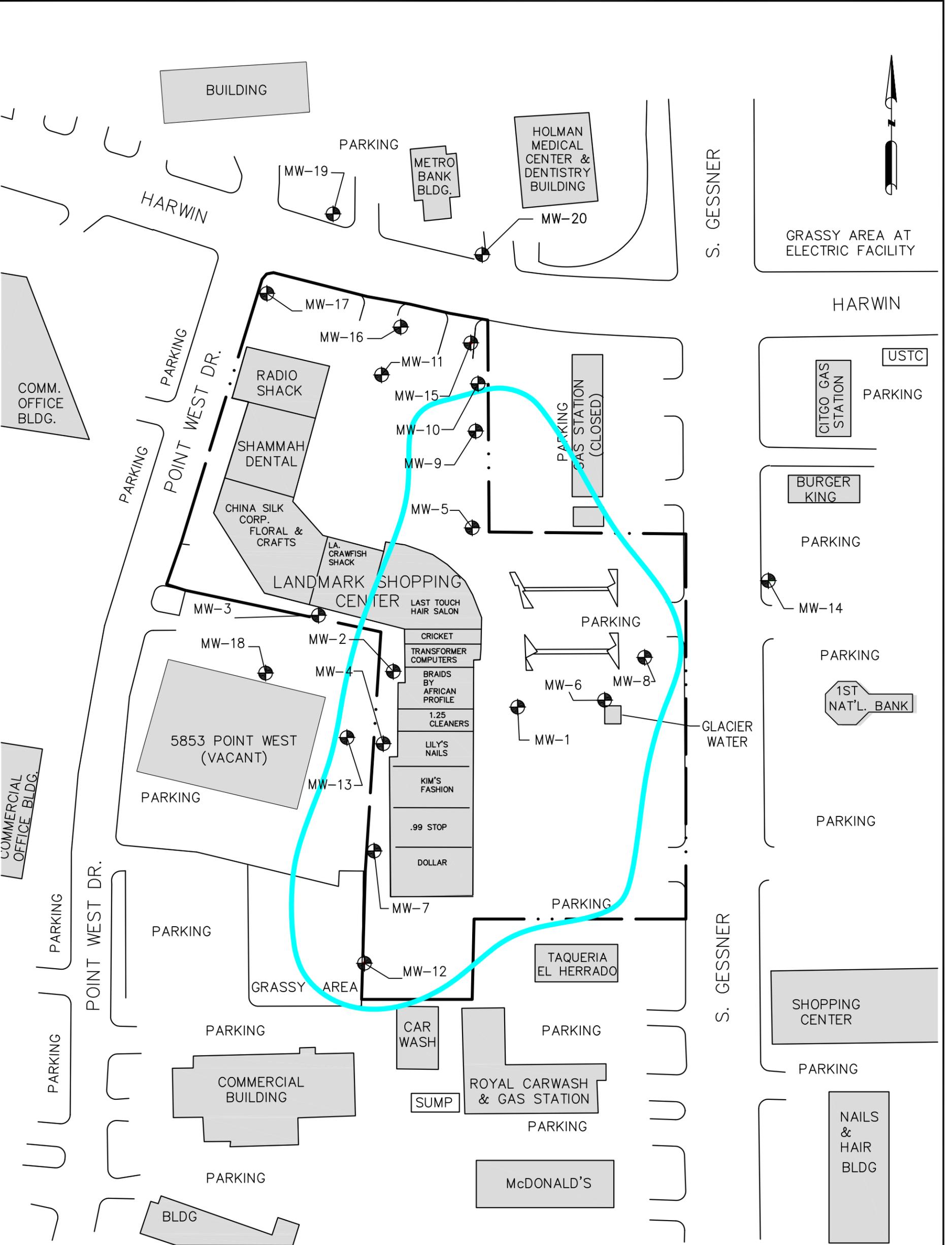
REFERENCE: HARRIS COUNTY FLOOD CONTROL DISTRICT (WATERSHEDS AND CHANNELS REFERENCE GUIDE 12-10-2007)

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WATERSHED MAP



FIGURE
B4



GRASSY AREA AT ELECTRIC FACILITY

HARWIN
 CITGO GAS STATION
 USTC
 PARKING

BURGER KING
 PARKING
 MW-14

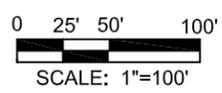
PARKING
 1ST NAT'L. BANK
 PARKING

S. GESSNER
 SHOPPING CENTER
 PARKING

NAILS & HAIR BLDG

LEGEND / NOTES

-  MONITORING WELL LOCATION
-  APPROXIMATE EXTENT OF AFFECTED GROUNDWATER
-  APPROXIMATE PROPERTY BOUNDARY
-  EXISTING STRUCTURE

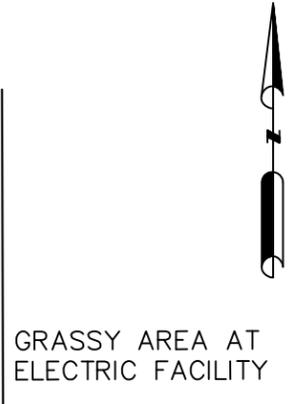
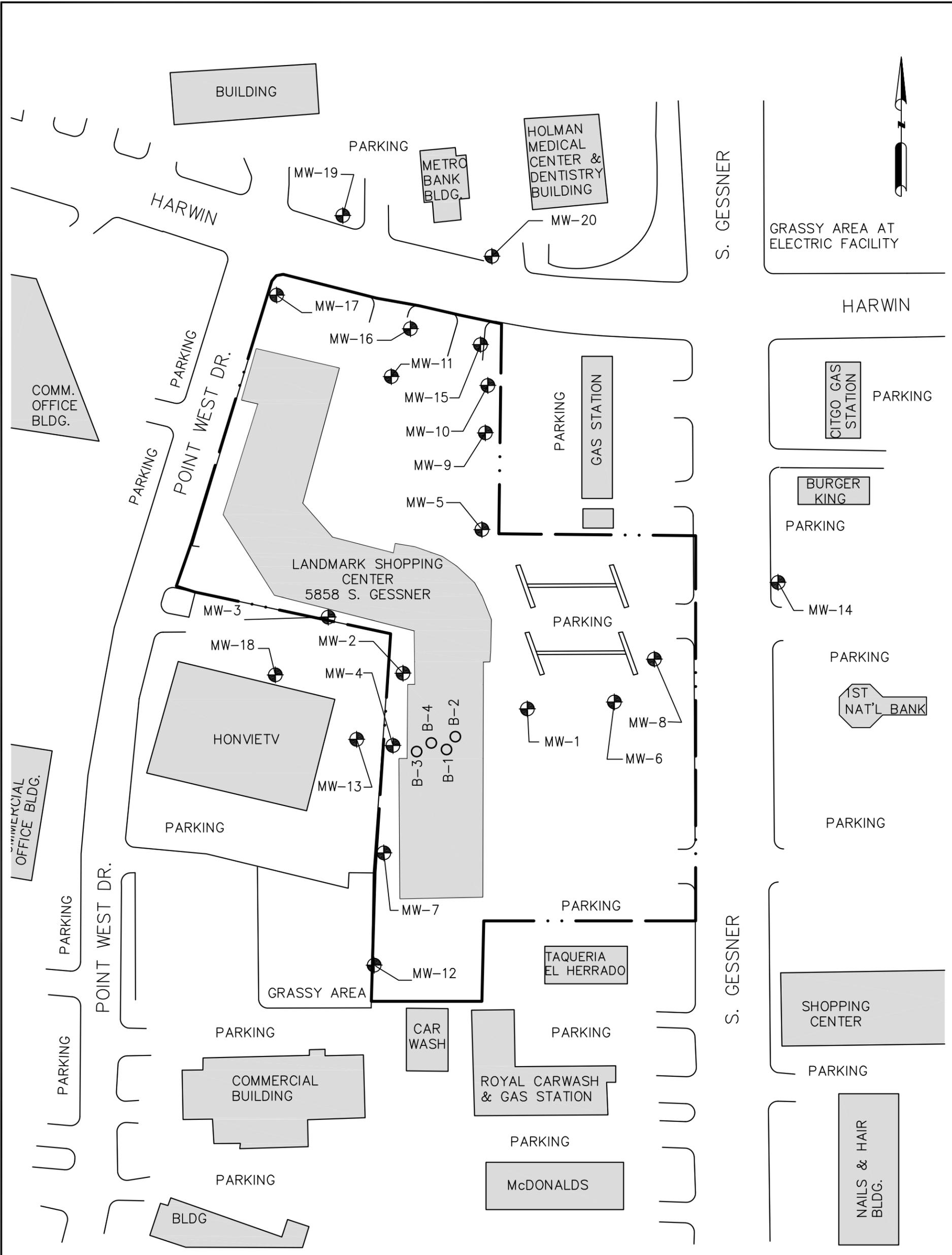


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 HOUSTON, TEXAS
 MUNICIPAL SETTING DESIGNATION APPLICATION

AFFECTED GROUNDWATER MAP

 **ARCADIS**

FIGURE **B5**



GRASSY AREA AT ELECTRIC FACILITY

HARWIN
 CITGO GAS STATION
 PARKING

BURGER KING
 PARKING

MW-14

PARKING
 1ST NAT'L BANK

PARKING

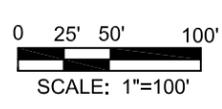
S. GESSNER
 SHOPPING CENTER

PARKING

NAILS & HAIR BLDG.

LEGEND

- MW-5 MONITORING WELL LOCATION & ID
- APPROXIMATE PROPERTY BOUNDARY
- EXISTING STRUCTURE
- B-1 APPROXIMATE BORING LOCATION & ID (BUCHANAN ENVIRONMENTAL ASSOC., JULY 2009)

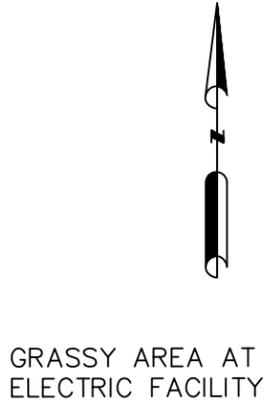
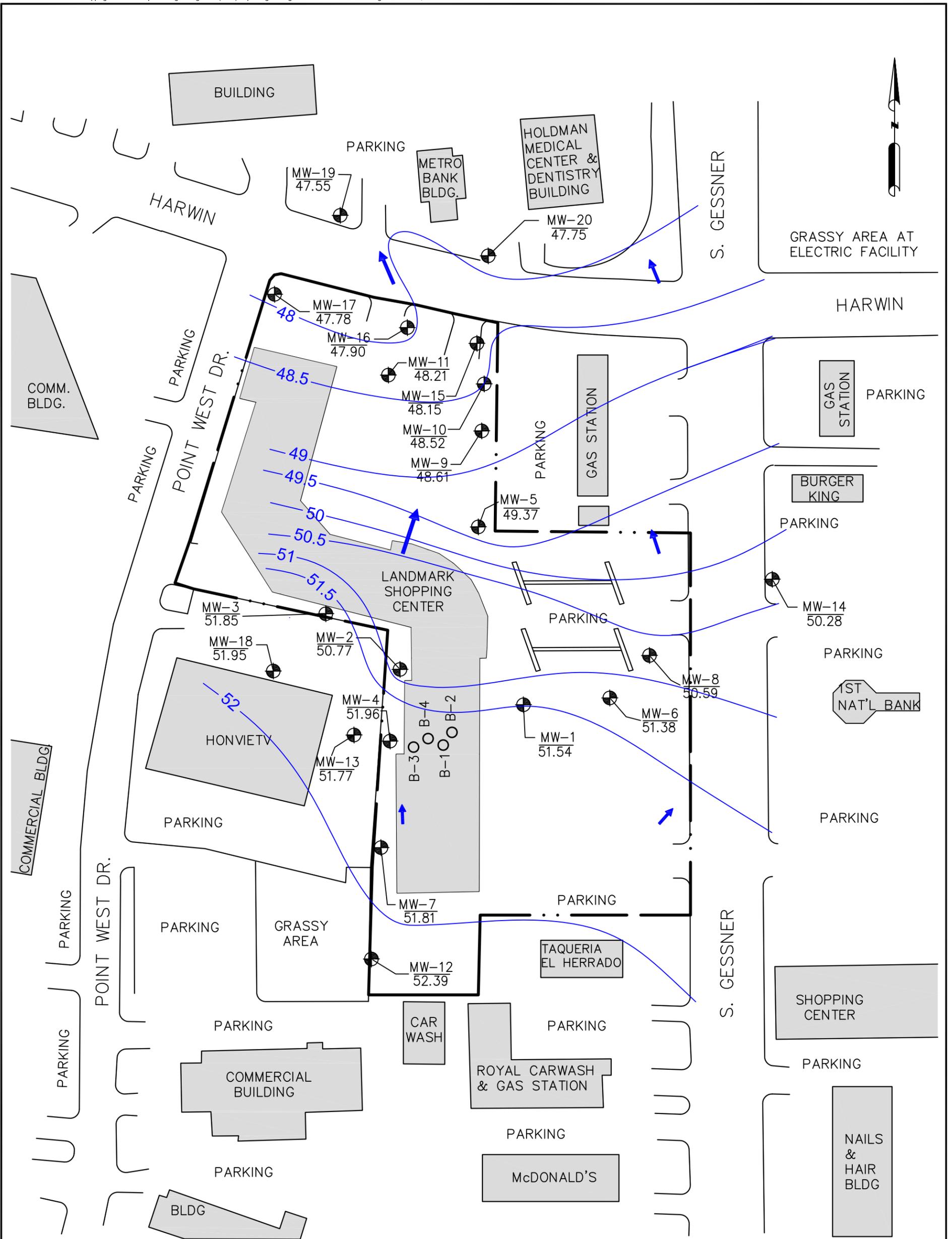


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SOIL SAMPLE AND GROUNDWATER WELL LOCATIONS

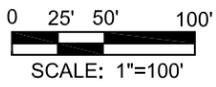


FIGURE
B6



LEGEND

- MW-5 49.37 MONITORING WELL LOCATION & ID
GROUNDWATER ELEVATIONS (MEASURED AT WELL)
- APPROXIMATE PROPERTY BOUNDARY
- EXISTING STRUCTURE
- B-1 APPROXIMATE BORING LOCATION & ID
(BUCHANAN ENVIRONMENTAL ASSOC., JULY 2009)
- GROUNDWATER FLOW DIRECTION
- POTENTIOMETRIC CONTOURS (0.5' INTERVALS)

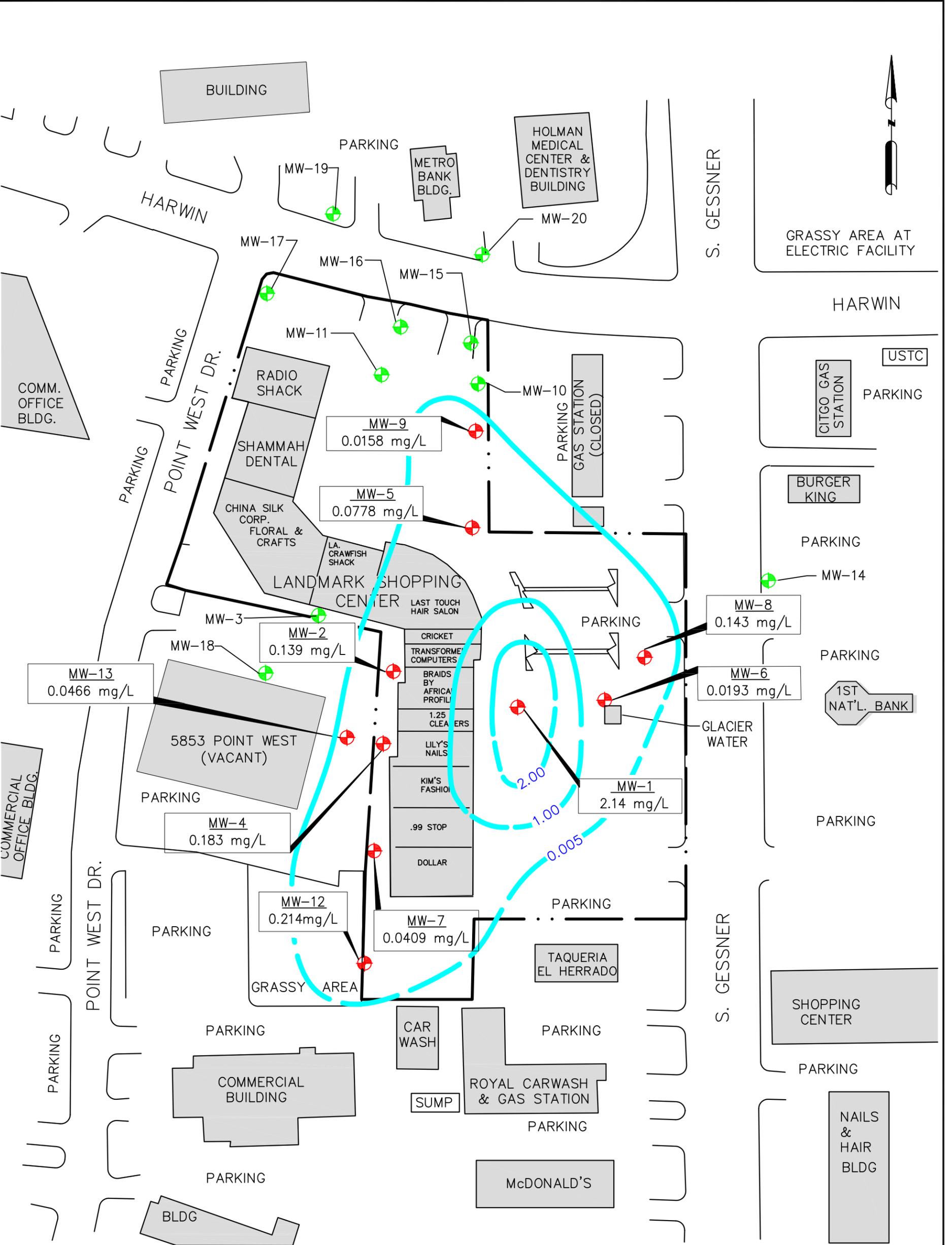


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**POTENTIOMETRIC SURFACE MAP
 NOVEMBER 2011**



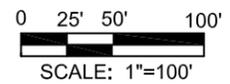
FIGURE
B7



LEGEND / NOTES

NOTE: TIER 1 RESIDENTIAL PROTECTIVE CONCENTRATION LEVEL = 0.005 mg/L

-  MONITORING WELL WITH TETRACHLOROETHENE CONCENTRATION < 0.005 mg/L
-  MONITORING WELL WITH TETRACHLOROETHENE CONCENTRATION > 0.005 mg/L
-  1.00 TETRACHLOROETHENE CONCENTRATION CONTOUR
-  APPROXIMATE PROPERTY BOUNDARY
-  EXISTING STRUCTURE

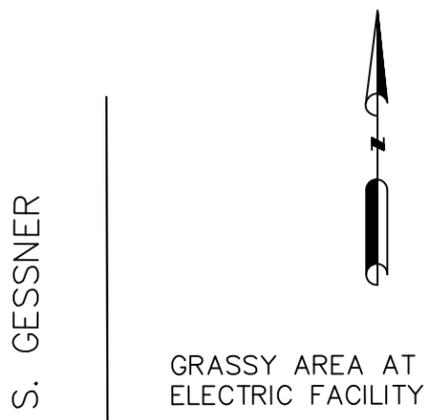
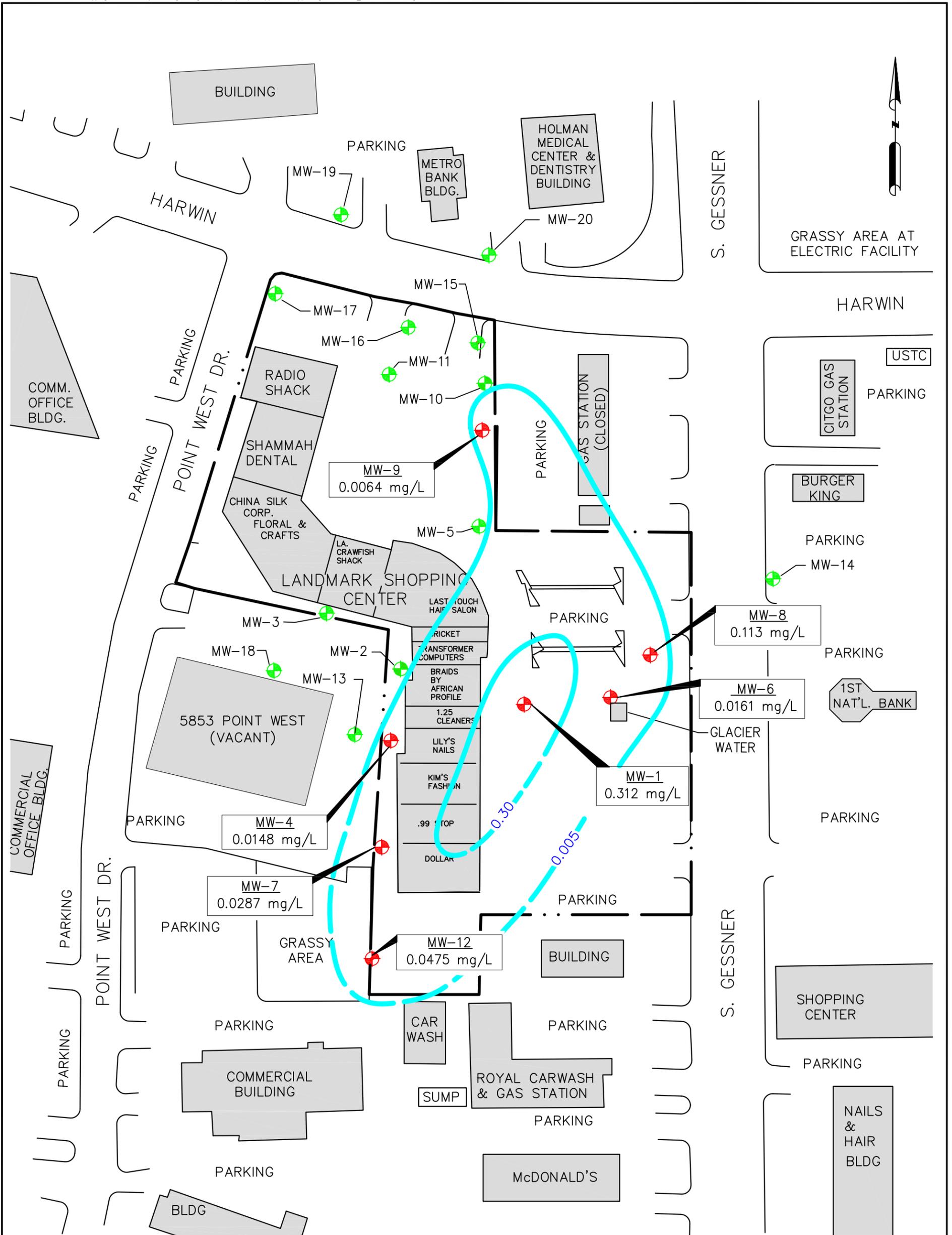


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 HOUSTON, TEXAS

**ISOCONCENTRATION MAP
 TETRACHLOROETHENE
 IN GROUNDWATER- NOVEMBER 2011**



FIGURE
B8



LEGEND / NOTES

NOTE: TIER 1 RESIDENTIAL PROTECTIVE CONCENTRATION LEVEL = 0.005 mg/L

-  MONITORING WELL WITH TRICHLOROETHENE CONCENTRATION < 0.005 mg/L
-  MONITORING WELL WITH TRICHLOROETHENE CONCENTRATION > 0.005 mg/L
-  0.30 TRICHLOROETHENE CONCENTRATION CONTOUR
-  0.005 TRICHLOROETHENE CONCENTRATION CONTOUR
-  APPROXIMATE PROPERTY BOUNDARY
-  EXISTING STRUCTURE

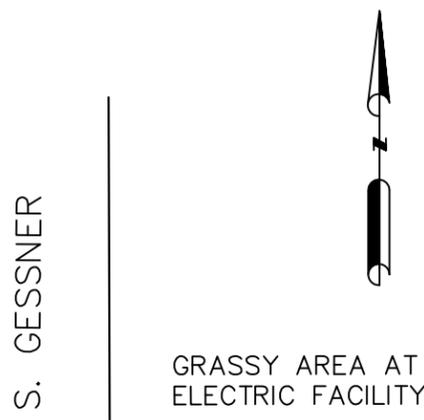
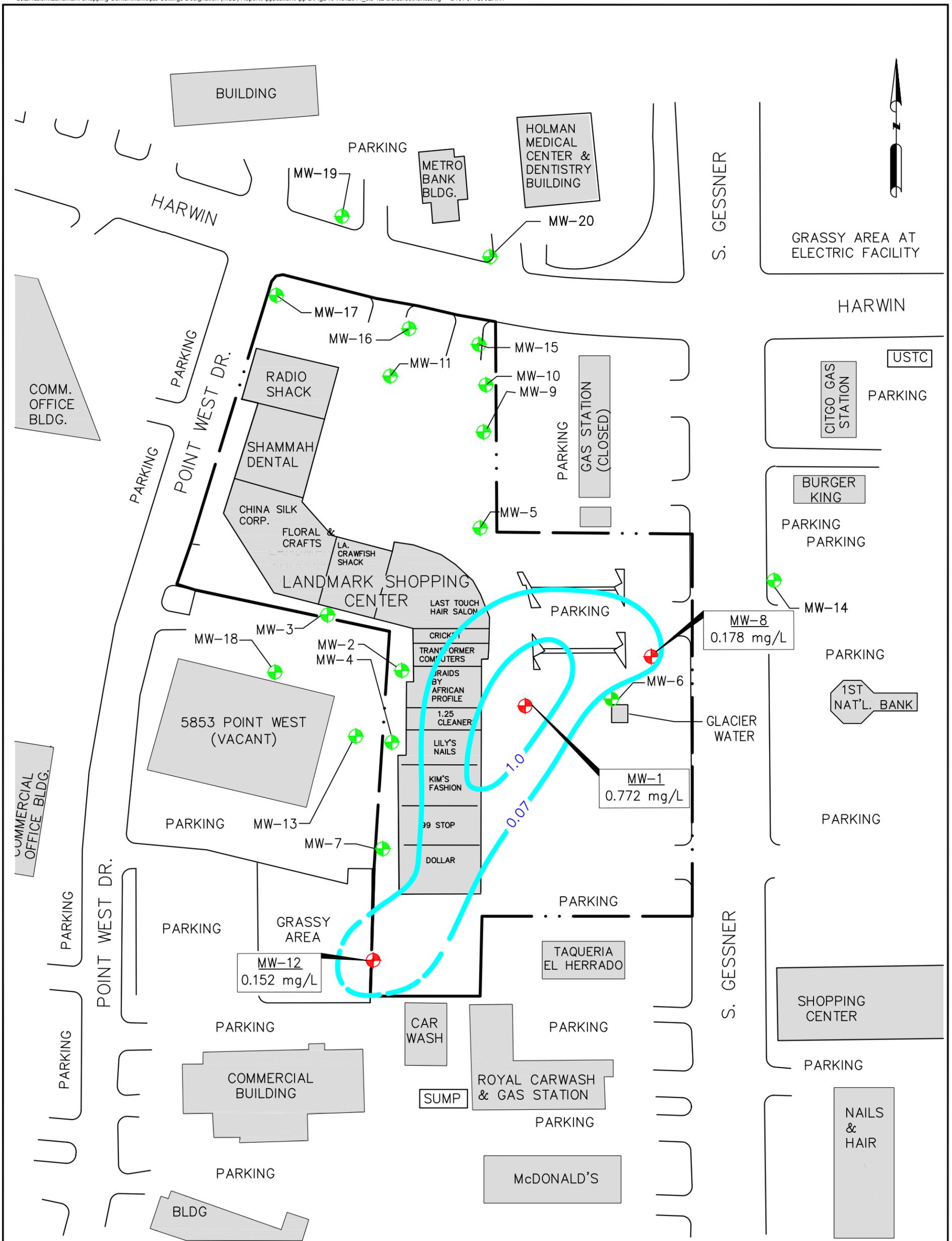
0 25' 50' 100'
SCALE: 1"=100'

LANDMARK SHOPPING CENTER
5858 SOUTH GESSNER ROAD
HOUSTON, TEXAS

**ISOCONCENTRATION MAP
TRICHLOROETHENE IN GROUNDWATER
NOVEMBER 2011**

 **ARCADIS**

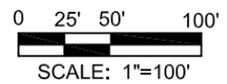
FIGURE
B9



LEGEND / NOTES

NOTE: TIER 1 RESIDENTIAL PROTECTIVE CONCENTRATION LEVEL = 0.07 mg/L

-  MONITORING WELL WITH CIS- 1,2 DICHLOROETHENE CONCENTRATION < 0.07 mg/L
-  MONITORING WELL WITH CIS- 1,2 DICHLOROETHENE CONCENTRATION > 0.07 mg/L
-  1.0 CIS- 1,2 DICHLOROETHENE CONCENTRATION CONTOUR
-  APPROXIMATE PROPERTY BOUNDARY
-  EXISTING STRUCTURE

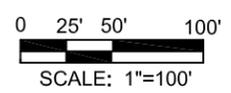
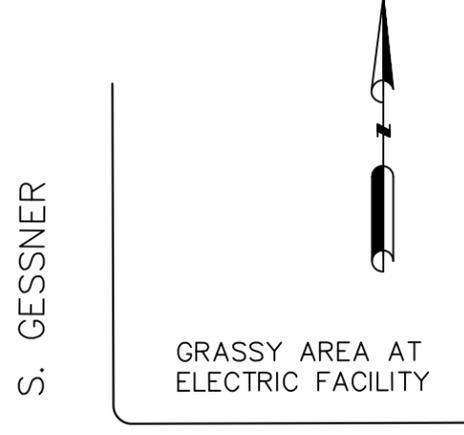
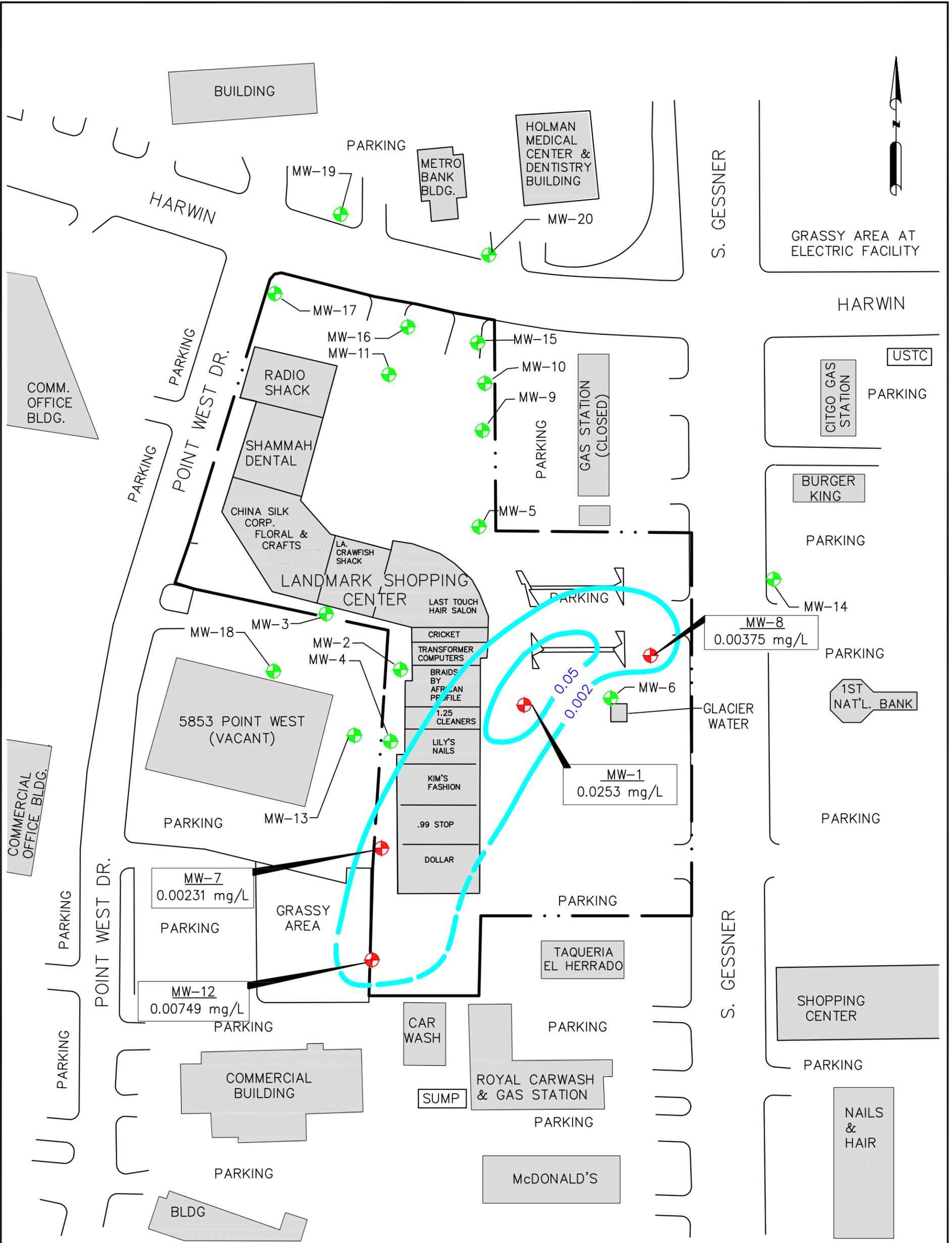


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 5858 SOUTH GESSNER ROAD
 HOUSTON, TEXAS

**ISOCONCENTRATION MAP
 CIS- 1,2 DICHLOROETHENE
 IN GROUNDWATER- NOVEMBER 2011**

 **ARCADIS**

FIGURE
B10



LEGEND / NOTES

NOTE: TIER 1 RESIDENTIAL PROTECTIVE CONCENTRATION LEVEL = 0.002 mg/L

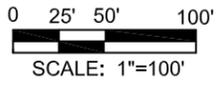
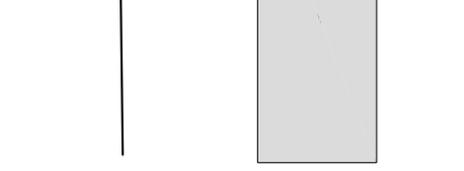
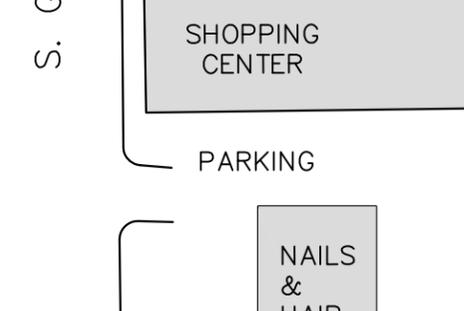
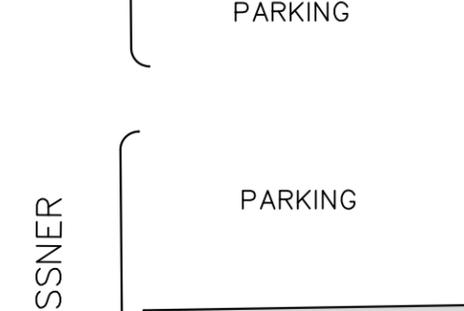
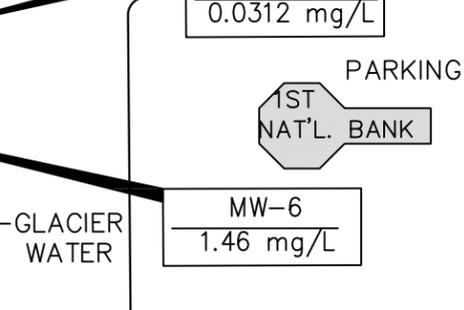
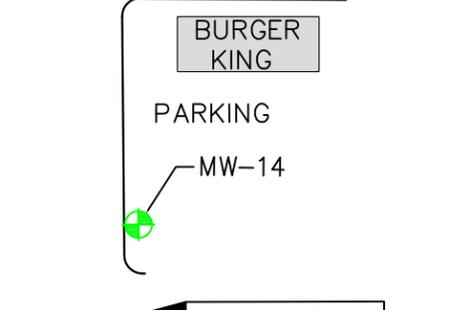
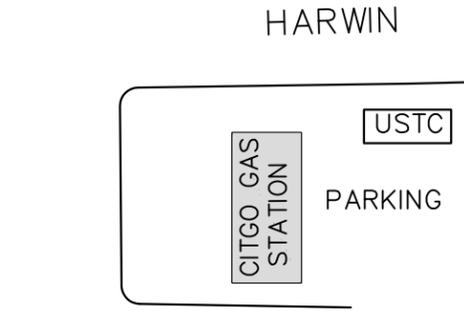
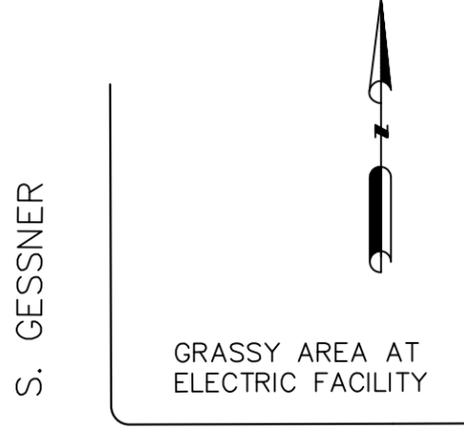
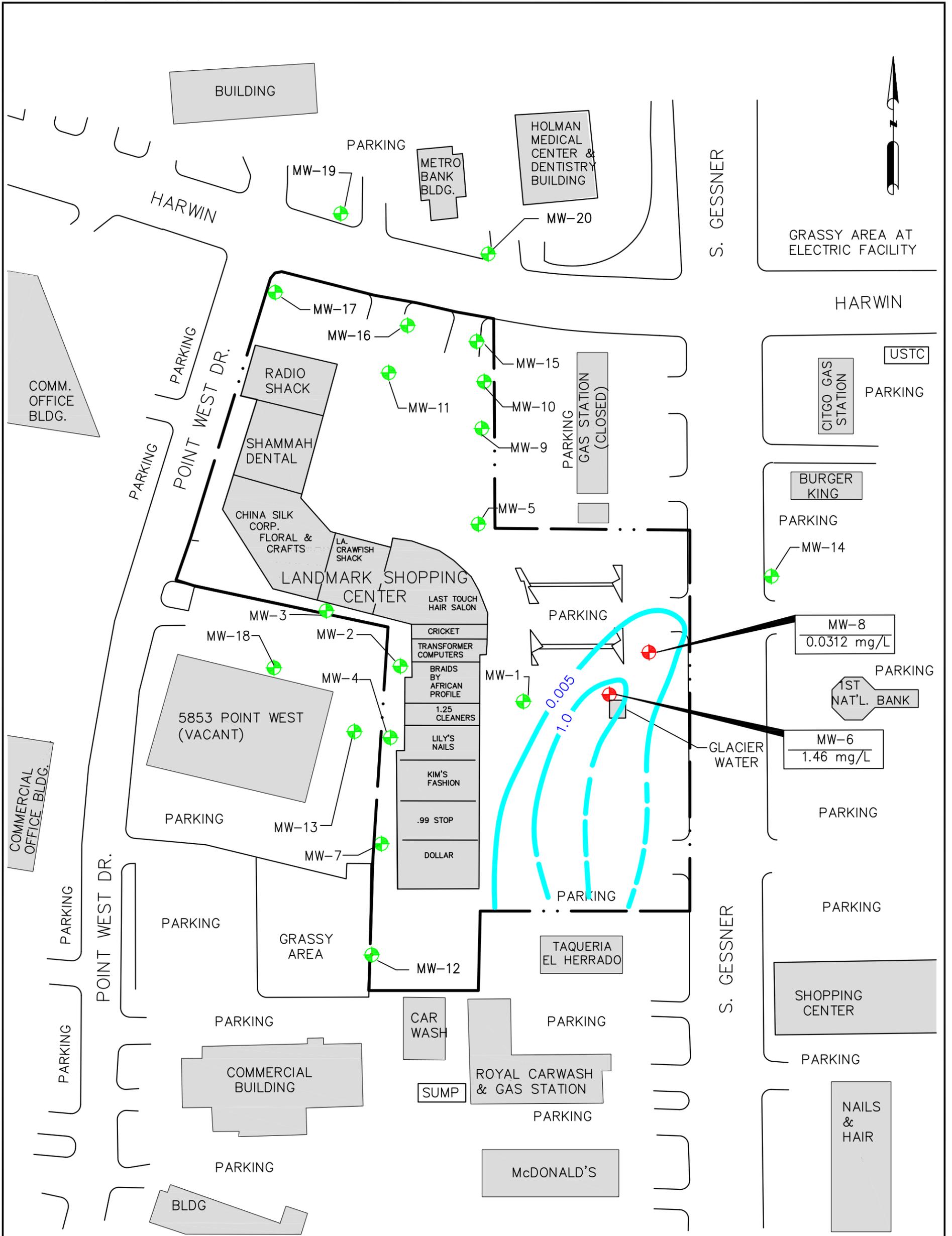
- MONITORING WELL WITH VINYL CHLORIDE CONCENTRATION < 0.002 mg/L
- MONITORING WELL WITH VINYL CHLORIDE CONCENTRATION > 0.002 mg/L
- 0.05 VINYL CHLORIDE CONCENTRATION CONTOUR
- APPROXIMATE PROPERTY BOUNDARY
- EXISTING STRUCTURE

LANDMARK SHOPPING CENTER
 5858 SOUTH GESSNER ROAD
 HOUSTON, TEXAS

**ISOCONCENTRATION MAP
 VINYL CHLORIDE IN GROUNDWATER
 NOVEMBER 2011**

ARCADIS

FIGURE
B11



LEGEND / NOTES

NOTE: TIER 1 RESIDENTIAL PROTECTIVE CONCENTRATION LEVEL = 0.005 mg/L

- MONITORING WELL WITH BENZENE CONCENTRATION < 0.005 mg/L
- MONITORING WELL WITH BENZENE CONCENTRATION > 0.005 mg/L
- BENZENE CONCENTRATION CONTOUR
- APPROXIMATE PROPERTY BOUNDARY
- EXISTING STRUCTURE

LANDMARK SHOPPING CENTER
 5858 SOUTH GESSNER ROAD
 HOUSTON, TEXAS

**ISOCONCENTRATION MAP
 BENZENE IN GROUNDWATER
 NOVEMBER 2011**

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FIGURE
B12

Appendix C

Current and Future Property Use

Item 3: A description of the current use and, to the extent known, the anticipated uses, of the designated property and properties within 500 feet of the boundary of the designated property.

The Landmark Shopping Center property (site) is currently owned by L.D. Interests, Inc., A Texas Corporation, and consists of a single multi-tenant building and associated parking lots and driveways. The area has been used as commercial property for many years and it is likely that the property will continue to be used for commercial purposes for the foreseeable future.

Current land use in the vicinity of the property is primarily commercial. Many of the surrounding properties are utilized as restaurants, office buildings and retail businesses. A public roadway, South Gessner Road, runs along the eastern property boundary with commercial/retail businesses further to the east. Harwin Drive runs along the northern boundary with commercial/retail businesses further to the north. Point West Drive runs along the western boundary with office buildings and retail business further to the west. Adjacent property to the south is occupied by commercial businesses.

Appendix D

Ingestion Protective Concentration Level Exceedence Zone Discussion

Item 4: For each contaminant of concern within the ingestion protective concentration level exceedance zone, to the extent known, provide the following:

- a. A description of the ingestion protective concentration level exceedance zone (IPCLEZ) and the non-ingestion protective concentration level exceedance zone (non-IPCLEZ), including a specification of the horizontal area and the minimum and maximum depth below ground surface.**
- b. The level of contamination, the ingestion protective concentration level, and the non-ingestion protective concentration level, all expressed as mg/L units.**
- c. Its basic geochemical properties (e.g., whether the contaminant of concern migrates with groundwater, floats or is soluble in water).**

a) COCs in IPCLEZ that exceed the ingestion PCLs are the following:

- Aromatic hydrocarbons - benzene
- Halogenated volatile organic compounds (VOCs) - tetrachloroethylene (PCE), trichloroethylene (TCE), cis-1,2-dichloroethylene (cis-1,2-DCE), and vinyl chloride (VC).

Benzene is not a chemical associated with past activities at the shopping center and is believed to have originated from an off-site upgradient source (south). The upper water-bearing zone in this area begins at approximately 12 ft below ground surface (bgs) and extends to a confining clay layer approximately 50 ft bgs.

- i. The IPCLEZ for dissolved PCE in the water-bearing zone encompasses an area that extends roughly from the southern half of the site property to the east-central portion of the property. The wells in the IPCLEZ and the concentrations in those wells are given in **Table D-1** and a map IPCLEZ for PCE is shown in **Figure B-8**.
- ii. The IPCLEZ for TCE in the water-bearing zone extends from the southern half of the site property to the northeast area of the property. The wells in the IPCLEZ and the concentrations in those wells are given in **Table D-1** and a map of IPCLEZ for TCE is shown in **Figure B-9**.
- iii. The IPCLEZ for cis-1,2-DCE in the upper water-bearing zone encompasses an area that extends roughly from the southern half of the property to the east-central portion of the property. The wells in the IPCLEZ and the concentrations in those wells are given in **Table D-1** and a map of the IPCLEZ for cis-1,2-DCE is provided as **Figure B-10**.
- iv. The IPCLEZ for vinyl chloride in the upper water-bearing zone is present from the south-central portion of the site property and extends to the east-central portion of the property.

The wells in the IPCLEZ and the concentrations in those wells are given in **Table D-1** and a map of the IPCLEZ for vinyl chloride is provided as **Figure B-11**.

- v. The IPCLEZ for benzene in the upper water-bearing zone is present from the southeast portion of the site property and extends along the east side of the property. The wells in the IPCLEZ and the concentrations in those wells are given in **Table D-1** and a map of the IPCLEZ for benzene is provided as **Figure B-12**.
- b) The contamination levels of the COCs in all the wells within the groundwater plume are given in **Table D-1**. The ingestion protective concentration levels, which are also the Tier 1 Residential $^{GW}GW_{Ing}$ Protective Concentration Limit (PCL) under the Texas Commission on Environmental Quality's (TCEQ) Texas Risk Reduction Program (TRRP) are given for each COC in mg/L and the contamination level in each well is compared to that value. Exceedences of the ingestion protective concentration level are highlighted in blue. The non-ingestion protective concentration levels are the Tier 1 Residential $^{Air}GW_{Inh-V}$ PCLs under the TRRP, and are also given for each COC in **Table D-1**. There are no exceedences of the non-ingestion protective concentration levels.
- c) The COCs in the IPCLEZ include benzene and chlorinated VOCs (PCE, TCE and their daughter products cis-1,2-DCE and vinyl chloride). These constituents have been detected in soils and as dissolved chemicals in groundwater. The COCs can migrate in the dissolved phase with the natural groundwater flow. The PCL exceedance zones for the COCs are generally consistent with historical data collected at the site and indicate that the overall affected groundwater plume is generally stable and does not show any significant change or expansion.

Chlorinated VOCs can occur as a dense non-aqueous phase liquid (DNAPL) that is denser than water and would be found at the bottom of the water table. Benzene can occur as a light non-aqueous phase liquid (LNAPL) that is lighter than water and would be found at the top of the water table. No LNAPL or DNAPL have ever been observed at the site and the dissolved concentrations of the COCs do not suggest that any NAPL is present.

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**Table D-1. IPCLEZ and Non-IPCLEZ in Groundwater
Landmark Shopping Center
Amarillo, Texas**

	Tetrachloroethene (PCE)	Trichloroethene (TCE)	cis-1,2-Dichloroethene (cis-1,2-DCE)	Benzene	Vinyl Chloride
Ingestion Protective Concentration Level (Tier 1 Residential ^{GW} GW _{ing} PCL)	0.005	0.005	0.07	0.005	0.002
Non-Ingestion Protective Concentration Level (Tier 1 Residential ^{Air} GW _{Inh-V} PCL)	498.45	118.29	1228.85	179.88	3.81
Upper Water Bearing Zone	mg/L	mg/L	mg/L	mg/L	mg/L
MW-1 (November 2011)	2.14	0.312	0.772	<0.0000800	0.0253
MW-2 (November 2011)	0.139	0.00429	0.00334	<0.0000800	<0.000110
MW-3 (November 2011)	<0.000130	<0.000180	<0.0000600	<0.0000800	<0.000110
MW-4 (November 2011)	0.183	0.0148	0.515	<0.0000800	<0.000110
MW-5 (November 2011)	0.0778	0.0026	<0.0000600	<0.0000800	<0.000110
MW-6 (November 2011)	0.0193	0.0161	0.0251	1.46	<0.000110
MW-7 (November 2011)	0.0409	0.0287	0.0352	<0.0000800	0.00231
MW-8 (November 2011)	0.143	0.113	0.178	0.0312	0.00375
MW-9 (November 2011)	0.0158	0.0065	0.00443	<0.0000800	<0.000110
MW-10 (November 2011)	<0.000130	<0.000180	0.000158 J	<0.0000800	<0.000110
MW-11 (November 2011)	0.000712 J	<0.000180	<0.0000600	<0.0000800	<0.000110
MW-12 (November 2011)	0.214	0.0475	0.152	0.000107 J	0.00749
MW-13 (November 2011)	0.0466	0.00113	<0.0000600	<0.0000800	<0.000110
MW-14 (November 2011)	0.000646 J	0.00209 J	0.000365 J	0.000416 J	<0.000110
MW-15 (November 2011)	0.000229 J	0.000303 J	0.000467 J	<0.0000800	<0.000110
MW-16 (November 2011)	<0.000130	0.00288 J	<0.0000600	<0.0000800	<0.000110
MW-17 (November 2011)	<0.000130	<0.000180	<0.0000600	<0.0000800	<0.000110
MW-18 (November 2011)	<0.000130	<0.000180	<0.0000600	<0.0000800	<0.000110
MW-19 (November 2011)	0.000235 J	<0.000180	<0.0000600	<0.0000800	<0.000110
MW-20 (November 2011)	<0.000130	<0.000180	<0.0000600	0.000178 J	<0.000110

Notes:

IPCLEZ- Ingestion Protective Concentration Level Exceedence Zone

Indicates constituent exceeds Ingestion Protective Concentration Level

Indicates constituent exceeds Non-Ingestion Protective Concentration Level

J - Compound was present but below the laboratory quantification limit.

Appendix E

Designated Groundwater Discussion

Item 5: For each contaminant of concern within the designated groundwater, to the extent known, provide the following:

- a. A description of the ingestion protective concentration level exceedance zone (IPCLEZ) and the non-ingestion protective concentration level exceedance zone (non-IPCLEZ), including a specification of the horizontal area and the minimum and maximum depth below ground surface.**
 - b. The level of contamination, the ingestion protective concentration level, and the non-ingestion protective concentration level, all expressed as mg/L units.**
 - c. Its basic geochemical properties (e.g., whether the contaminant of concern migrates with groundwater, floats or is soluble in water).**
- a) The contaminants of concern (COCs) in the designated groundwater are dissolved chlorinated volatile organic compounds (VOCs) including parent compounds (PCE and TCE), degradation (daughter) products (cis-1,2-DCE and vinyl chloride) and benzene. The COCs have impacted the upper water bearing zone. The upper water-bearing zone begins at approximately 12 to 15 ft bgs and extends to a confining clay layer approximately 50 ft bgs.
- i. The IPCLEZ for dissolved PCE in the water-bearing zone extends roughly from the southern half of the site property to the east-central portion of the property. The wells in the designated property in the IPCLEZ and the concentrations in those wells are given in **Table E-1** and **Figure B-8**. The IPCLEZ for PCE underlies an area of approximately 166,864 square ft.
 - ii. The IPCLEZ for TCE in the water-bearing zone extends from the southern half of the site property to the northeast area of the property. The wells in the designated property in the IPCLEZ and the concentrations in those wells are given in **Table E-1** and **Figure B-9**. The IPCLEZ for TCE underlies an area of approximately 138,403 square ft.
 - iii. The IPCLEZ for cis-1,2-DCE in the upper water-bearing zone encompasses an area that extends roughly from the southern half of the property to the east-central portion of the property. The wells in the designated property in the IPCLEZ and the concentrations in those wells are given in **Table E-1** and **Figure B-10**. The IPCLEZ for cis-1,2-DCE underlies an area of approximately 60,800 square ft.
 - iv. The IPCLEZ for vinyl chloride in the upper water-bearing zone is present from the south central portion of the site property and extends to the east-central portion of the property. The wells in the designated property in the IPCLEZ and the concentrations in those wells are given in **Table E-1** and **Figure B-11**. The IPCLEZ for vinyl chloride underlies an area of approximately 62,941 square ft.

- v. The IPCLEZ for benzene in the upper water-bearing zone is present from the southeast portion of the site property and extends along the east side of the property. The wells in the IPCLEZ and the concentrations in those wells are given in **Table E-1** and a map of the affected groundwater is provided as **Figure B-12**. The IPCLEZ for benzene underlies an area of approximately 41,768 square ft.
- b) The concentration levels of the COCs in all the wells in the designated groundwater area are provided in **Table E-1**. The ingestion protective concentration levels, which are the Tier 1 Residential $^{GW}GW_{ing}$ PCL under the TRRP, are given for each COC in mg/L and the concentration level in each well is compared to that value. Exceedances of the ingestion protective concentration level are highlighted in blue. The non-ingestion protective concentration levels, which are the Tier 1 Residential $^{Air}GW_{inh-v}$ PCL under TRRP, are also provided for each COC in the table in mg/L. There are no exceedances of these non-ingestion PCLs.
- c) The COCs in the designated groundwater include benzene and chlorinated VOCs (PCE, TCE and their daughter products cis-1,2-DCE and vinyl chloride). These constituents have been detected in soils and as dissolved chemicals in groundwater. The COCs can migrate in the dissolved phase with the natural groundwater flow. The PCL exceedance zones for the COCs are generally consistent with historical data collected at the site and indicate that the overall affected groundwater plume is generally stable and does not show any significant change or expansion.

Chlorinated VOCs can occur as a dense non-aqueous phase liquid (DNAPL) that is denser than water and would be found at the bottom of the water table. Benzene can occur as a light non aqueous phase liquid (LNAPL) that is lighter than water and would be found at the top of the water table. No LNAPL or DNAPL have ever been observed at the site and the dissolved concentrations of the COCs do not suggest that any NAPL is present.

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Table E-1. IPCLEZ and Non-IPCLEZ in Designated Groundwater
Landmark Shopping Center
Amarillo, Texas

	Tetrachloroethene (PCE)	Trichloroethene (TCE)	cis-1,2-Dichloroethene (cis-1,2-DCE)	Benzene	Vinyl Chloride
Ingestion Protective Concentration Level (Tier 1 Residential ^{GW} GW _{ing} PCL)	0.005	0.005	0.07	0.005	0.002
Non-Ingestion Protective Concentration Level (Tier 1 Residential ^{Air} GW _{inh-v} PCL)	498.45	118.29	1228.85	179.88	3.81
Upper Water Bearing Zone	mg/L	mg/L	mg/L	mg/L	mg/L
MW-1 (November 2011)	2.14	0.312	0.772	<0.0000800	0.0253
MW-2 (November 2011)	0.139	0.00429	0.00334	<0.0000800	<0.000110
MW-4 (November 2011)	0.183	0.0148	0.515	<0.0000800	<0.000110
MW-5 (November 2011)	0.0778	0.0026	<0.0000600	<0.0000800	<0.000110
MW-6 (November 2011)	0.0193	0.0161	0.0251	1.46	<0.000110
MW-7 (November 2011)	0.0409	0.0287	0.0352	<0.0000800	0.00231
MW-8 (November 2011)	0.143	0.113	0.178	0.0312	0.00375
MW-9 (November 2011)	0.0158	0.0065	0.00443	<0.0000800	<0.000110
MW-12 (November 2011)	0.214	0.0475	0.152	0.000107 J	0.00749
MW-13 (November 2011)	0.0466	0.00113	<0.0000600	<0.0000800	<0.000110

Notes:

IPCLEZ- Ingestion Protective Concentration Level Exceedence Zone

Indicates constituent exceeds Ingestion Protective Concentration Level

Indicates constituent exceeds Non-Ingestion Protective Concentration Level

J - Compound was present but below the laboratory quantification limit.

Appendix F

Maximum Contaminants of Concern Concentrations

Item 6: A table displaying the following information for each contaminant of concern, to the extent known:

- a. The maximum concentration level for soil and groundwater, the ingestion protective concentration level, and the non-ingestion protective concentration level, all expressed as mg/L units.**
- b. The critical protective concentration level without the municipal setting designation, highlighting any exceedances.**

Table F-1.1 shows the maximum concentrations of PCE, TCE, cis-1,2-DCE, vinyl chloride and benzene detected in soils compared to the ingestion protective concentration level (IPCL). The table includes the sample locations, depth and the sample collection dates. The maximum detected concentrations of PCE, TCE and cis-1,2-DCE were .0414, .0075 and .0265 mg/kg, respectively. Vinyl chloride and benzene were not detected in the soil samples. The IPCL for soil is the Tier 1 Residential ^{GW}Soil_{ing} protective concentration level (PCL) described by the TRRP. As shown on **Table F-1.1**, none of the maximum concentrations of COCs in soil exceeded any of the IPCLs.

Table F-1.2 shows the maximum concentrations of PCE, TCE, cis-1,2-DCE, vinyl chloride and benzene detected in soils compared to the non-ingestion protective concentration level (non-IPCL). The non-IPCLs in soil for the contaminants of concern are the Tier 1 Residential ^{Tot}Soil_{Comb} PCLs described in the TRRP. An exceedance of these PCLs indicates that a risk to human health exists via exposure to the soil through the inhalation, ingestion, dermal contact and vegetable consumption pathways. As shown on **Table F-1.2**, none of the maximum concentrations in soils exceeded any of the non-IPCLs (i.e. the critical PCL with an MSD).

Table F-2.1 shows the maximum concentrations of PCE, TCE, cis-1,2-DCE, vinyl chloride and benzene detected in groundwater during the most recent sampling event (November 2011) compared to the ingestion protective concentration level (IPCL). The IPCLs for the contaminants in groundwater were are the Tier 1 Residential ^{GW}GW_{ing} PCLs as set by the TCEQ. An exceedance of these PCLs indicates that a risk to human health exists should the groundwater be ingested. As shown on **Table F-2.1**, the historical maximum concentration for PCE, TCE, 1,2-DCE and vinyl chloride in groundwater exceeded the IPCL (i.e. the critical PCL without an MSD).

Table F-2.2 shows the maximum concentrations of PCE, TCE, cis-1,2-DCE, vinyl chloride and benzene detected in groundwater during the most recent sampling event (November 2011) compared to the non-ingestion protective concentration level (non-IPCL). The non-IPCLs for all four contaminants in groundwater are the Tier 1 Residential ^{Air}GW_{inh-v} PCLs as set by the TCEQ. An exceedance of these PCLs indicates a risk to human health exists should a person inhale vapors emanating from the groundwater. As shown on **Table F-2.2**, none of the maximum concentrations in groundwater exceeded any of the non-IPCLs (i.e. the critical PCL with an MSD).

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**Table F-1. Maximum Constituent Concentrations in Soils
Landmark Shopping Center
Amarillo, Texas**

Table F-1.1: Maximum Constituent Concentrations in Soil Compared to IPCL

Contaminant of Concern	IPCL ^{GW} SOIL _{Ing} (mg/kg)	non-IPCL ^{Tot} Soil _{Comb} (mg/kg)	Critical PCL (no MSD) (mg/kg)	Max Concentration (mg/kg)	2004 Sampling Event Date	Well ID	Depth
Tetrachloroethene (PCE)	5.0E-02	1.0E+02	5.0E-02	4.1E-02	6/28/2004	MW-2	17 - 18'
Trichloroethene (TCE)	3.4E-02	1.2E+02	3.4E-02	7.5E-03	7/2/2004	MW-4	13'
cis-1,2-Dichloroethene (cis-1,2-DCE)	2.5E-01	1.4E+02	2.5E-01	2.7E-02	7/2/2004	MW-4	13'
Benzene	2.6E-02	1.2E+02	2.6E-02	<0.005	not detected		
Vinyl Chloride	2.2E-02	3.7E+00	2.2E-02	<0.010	not detected		

Indicates sample exceeds the Critical PCL without a Municipal Settings Designation (MSD)

IPCL: Ingestion Protective Concentration Level is the critical PCL without a Municipal Settings Designation (MSD)

Non-IPCL: Non-Ingestion Protective Concentration Level is the critical PCL with a Municipal Settings Designation (MSD)

^{GW}SOIL_{Ing}. PCL for constituents in soil leaching to groundwater

^{Tot}Soil_{Comb}. Tier 1 PCL for total soil combined (human exposure through inhalation, ingestion and dermal contact)

Table F-1.2: Maximum Constituent Concentrations in Soil Compared to Non-IPCL

Contaminant of Concern	IPCL ^{GW} SOIL _{Ing} (mg/kg)	non-IPCL ^{Tot} Soil _{Comb} (mg/kg)	Critical PCL (with MSD) (mg/kg)	Max Concentration (mg/kg)	2004 Sampling Event Date	Well ID	
Tetrachloroethene (PCE)	5.0E-02	1.0E+02	1.0E+02	4.1E-02	6/28/2004	MW-2	17 - 18'
Trichloroethene (TCE)	3.4E-02	1.2E+02	1.2E+02	7.5E-03	7/2/2004	MW-4	13'
cis-1,2-Dichloroethene (cis-1,2-DCE)	2.5E-01	1.4E+02	1.4E+02	2.7E-02	7/2/2004	MW-4	13'
Benzene	2.6E-02	1.2E+02	1.2E+02	<0.005	not detected		
Vinyl Chloride	2.2E-02	3.7E+00	3.7E+00	<0.010	not detected		

Indicates sample exceeds the Critical PCL with a Municipal Settings Designation (MSD)

IPCL: Ingestion Protective Concentration Level is the critical PCL without a Municipal Settings Designation (MSD)

Non-IPCL: Non-Ingestion Protective Concentration Level is the critical PCL with a Municipal Settings Designation (MSD)

^{GW}SOIL_{Ing}. PCL for constituents in soil leaching to groundwater

^{Tot}Soil_{Comb}. Tier 1 PCL for total soil combined (human exposure through inhalation, ingestion and dermal contact)

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**Table F-2. Maximum Constituent Concentrations in Groundwater
Landmark Shopping Center
Amarillo, Texas**

Table F-2.1: Maximum Constituent Concentrations in Groundwater Compared to IPCL

Contaminant of Concern	IPCL ^{GW} _{GW_{ing}} (mg/L)	non-IPCL ^{Air} _{GW_{Inh-V}} (mg/L)	Critical PCL (no MSD) (mg/L)	Max Concentration November 2011 Event (mg/L)	Well ID	Historical Max Concentration (mg/L)	Well ID	Date Sampled
Tetrachloroethene (PCE)	5.0E-03	5.0E+02	5.0E-03	2.1E+00	MW-1	9.3E+00	MW-4	7/7/2004
Trichloroethene (TCE)	5.0E-03	1.2E+02	5.0E-03	3.1E-01	MW-1	3.6E-01	MW-4	7/7/2004
cis-1,2-Dichloroethene (cis-1,2-DCE)	7.0E-02	1.2E+03	7.0E-02	7.7E-01	MW-1	1.9E+00	MW-4	7/7/2004
Benzene	5.0E-03	1.8E+02	5.0E-03	1.5E+00	MW-6	2.2E+00	MW-6	3/29/2011
Vinyl Chloride	2.0E-03	3.8E+00	2.0E-03	2.5E-02	MW-1	9.1E-02	MW-1	6/29/2011

Indicates sample exceeds the Critical PCL without a Municipal Settings Designation (MSD)

IPCL: Ingestion Protective Concentration Level is the critical PCL without a Municipal Settings Designation (MSD)

Non-IPCL: Non-Ingestion Protective Concentration Level is the critical PCL with a Municipal Settings Designation (MSD)

^{GW}GW_{ing} - Tier 1 PCL for ingestion of groundwater

^{Air}GW_{Inh-V} - Tier 1 PCL for human inhalation of vapors emanating from groundwater

Table F-2.2: Maximum Constituent Concentrations in Groundwater Compared to Non-IPCL

Contaminant of Concern	IPCL ^{GW} _{GW_{ing}} (mg/L)	non-IPCL ^{Air} _{GW_{Inh-V}} (mg/L)	Critical PCL (with MSD) (mg/L)	Max Concentration November 2011 Event (mg/L)	Well ID	Historical Max Concentration (mg/L)	Well ID	Date Sampled
Tetrachloroethene (PCE)	5.0E-03	5.0E+02	5.0E+02	2.1E+00	MW-1	9.3E+00	MW-4	7/7/2004
Trichloroethene (TCE)	5.0E-03	1.2E+02	1.2E+02	3.1E-01	MW-1	3.6E-01	MW-4	7/7/2004
cis-1,2-Dichloroethene (cis-1,2-DCE)	7.0E-02	1.2E+03	1.2E+03	7.7E-01	MW-1	1.9E+00	MW-4	7/7/2004
Benzene	5.0E-03	1.8E+02	1.8E+02	1.5E+00	MW-6	2.2E+00	MW-6	3/29/2011
Vinyl Chloride	2.0E-03	3.8E+00	3.8E+00	2.5E-02	MW-1	9.1E-02	MW-1	6/29/2011

Indicates sample exceeds the Critical PCL with a Municipal Settings Designation (MSD)

IPCL: Ingestion Protective Concentration Level is the critical PCL without a Municipal Settings Designation (MSD)

Non-IPCL: Non-Ingestion Protective Concentration Level is the critical PCL with a Municipal Settings Designation (MSD)

^{GW}GW_{ing} - Tier 1 PCL for ingestion of groundwater

^{Air}GW_{Inh-V} - Tier 1 PCL for human inhalation of vapors emanating from groundwater

Appendix G

Plume Stability Analysis

Item 7: A statement as to whether the plume of contamination is stable, expanding, or contracting, with the basis for that statement.

Groundwater in the water-bearing zone has been monitored since 2004. A discussion of the plume stability is discussed below.

The groundwater data collected at the site between 2004 and 2011 were evaluated using the Mann Kendall statistical trend analysis method. With the exception of increasing concentration trends identified in data from Wells MW-1, MW-7, MW-8 and MW-12 (located in up-gradient portions of the affected groundwater), the data from all of the other wells generally showed stable or decreasing trends. During this same timeframe, COC concentrations in down-gradient wells (MW-10, MW-11, MW-15 and MW-16) decreased to below the ingestion protective concentration levels (IPCLs). Although the Mann Kendall trend analysis showed increases in concentrations in upgradient portions of the affected groundwater, the down-gradient edge of the plume has receded over time, indicating that overall, the footprint of the affected groundwater is stable or declining.

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**Appendix G. Summary of Groundwater Analytical Data
Landmark Shopping Center
Houston, Texas**

Analyte	Tier 1 ^{GW} GW _{ing} PCL	MW-1	MW-1	MW-1	MW-1	MW-2	MW-2	MW-2	MW-2	MW-3
		7/7/2004	3/29/2011	6/29/2011	11/9/2011	7/7/2004	3/31/2011	6/30/2011	11/9/2011	7/7/2004
Benzene	5.0E-03	0.005	0.00008	0.00008	0.00008	0.005	0.00008	0.00008	0.00008	0.005
cis-1,2-Dichloroethene	7.0E-02	0.103	0.636	1.2	0.772	0.0576	0.0131	0.00805	0.00334	0.005
Ethylbenzene	7.0E-01	0.005	0.00011	0.00011	0.00011	0.005	0.00011	0.00011	0.00011	0.005
Tetrachloroethene	5.0E-03	0.974	2.43	2.29	2.14	3.11	0.445	0.164	0.139	0.005
Toluene	1.0E+00	0.005	0.000551	0.000272	0.000292	0.005	0.00015	0.00015	0.00015	0.005
Trichloroethene	5.0E-03	0.0588	0.239	0.353	0.312	0.0325	0.0125	0.00535	0.00429	0.005
Vinyl chloride	2.0E-03	0.01	0.0342	0.0906	0.0253	0.01	0.00011	0.00011	0.00011	0.01
Xylenes, Total	1.0E+01	0.015	0.000845	0.00026	0.00026	0.015	0.00026	0.00026	0.00026	0.015

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**Appendix G. Summary of Groundwater Analytical Data
Landmark Shopping Center
Houston, Texas**

Analyte	Tier 1 ^{GW} GW _{ing} PCL	MW-3	MW-3	MW-3	MW-4	MW-4	MW-4	MW-4	MW-5	MW-5
		3/30/2011	6/30/2011	11/9/2011	7/7/2004	3/29/2011	6/29/2011	11/9/2011	9/17/2004	3/30/2011
Benzene	5.0E-03	0.000304	0.00008	0.00008	0.1	0.000403	0.00008	0.00008	0.005	0.00008
cis-1,2-Dichloroethene	7.0E-02	0.00006	0.00006	0.00006	1.94	0.129	0.0293	0.0515	0.005	0.00006
Ethylbenzene	7.0E-01	0.00011	0.00011	0.00011	0.1	0.00011	0.00011	0.00011	0.005	0.00011
Tetrachloroethene	5.0E-03	0.000922	0.00023	0.00013	9.29	0.473	0.0771	0.183	0.0115	0.112
Toluene	1.0E+00	0.000459	0.00015	0.00015	0.1	0.000419	0.00015	0.00015	0.005	0.00015
Trichloroethene	5.0E-03	0.000184	0.00018	0.00018	0.363	0.0312	0.00665	0.0148	0.005	0.00258
Vinyl chloride	2.0E-03	0.00011	0.00011	0.00011	0.2	0.00011	0.00011	0.00011	0.01	0.00011
Xylenes, Total	1.0E+01	0.00046	0.00026	0.00026	0.3	0.000481	0.00026	0.00026	0.015	0.00026

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**Appendix G. Summary of Groundwater Analytical Data
Landmark Shopping Center
Houston, Texas**

Analyte	Tier 1 ^{GW} GW _{ing} PCL	MW-5	MW-5	MW-6	MW-6	MW-6	MW-6	MW-7	MW-7	MW-7
		6/30/2011	11/8/2011	9/17/2004	3/29/2011	6/28/2011	11/9/2011	9/17/2004	3/29/2011	6/29/2011
Benzene	5.0E-03	0.00008	0.00008	0.415	2.24	1.26	1.46	0.005	0.000163	0.00008
cis-1,2-Dichloroethene	7.0E-02	0.000205	0.00006	0.0368	0.0475	0.17	0.0251	0.005	0.0122	0.0226
Ethylbenzene	7.0E-01	0.00011	0.00011	0.0467	0.0744	0.0109	0.0816	0.005	0.00011	0.00011
Tetrachloroethene	5.0E-03	0.0369	0.0778	0.0726	0.0114	0.0229	0.0193	0.0174	0.0329	0.0307
Toluene	1.0E+00	0.00015	0.00015	0.005	0.0105	0.00299	0.0183	0.005	0.000377	0.00015
Trichloroethene	5.0E-03	0.00124	0.0026	0.0184	0.0226	0.0491	0.0161	0.00614	0.0232	0.0283
Vinyl chloride	2.0E-03	0.00011	0.00011	0.01	0.00011	0.00011	0.00011	0.01	0.00011	0.00011
Xylenes, Total	1.0E+01	0.00026	0.00026	0.109	0.0281	0.0099	0.0576	0.015	0.00026	0.00026

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**Appendix G. Summary of Groundwater Analytical Data
Landmark Shopping Center
Houston, Texas**

Analyte	Tier 1 ^{GW} GW _{ing} PCL	MW-7	MW-8	MW-8	MW-8	MW-8	MW-9	MW-9	MW-9	MW-9
		11/9/2011	12/22/2006	3/30/2011	6/30/2011	11/8/2011	12/22/2006	3/30/2011	6/28/2011	11/8/2011
Benzene	5.0E-03	0.00008	0.249	0.0977	0.0112	0.0312	0.00038	0.000233	0.000311	0.00008
cis-1,2-Dichloroethene	7.0E-02	0.0352	0.104	0.00006	0.0641	0.178	0.00038	0.0222	0.00366	0.00443
Ethylbenzene	7.0E-01	0.00011	0.00037	0.00011	0.00011	0.00011	0.00037	0.00011	0.00011	0.00011
Tetrachloroethene	5.0E-03	0.0409	0.061	0.134	0.0813	0.143	0.00583	0.0965	0.00622	0.0158
Toluene	1.0E+00	0.00015	0.00041	0.000415	0.00015	0.00017	0.0004	0.00015	0.00015	0.00015
Trichloroethene	5.0E-03	0.0287	0.0843	0.0514	0.0429	0.113	0.00038	0.0441	0.00431	0.0064
Vinyl chloride	2.0E-03	0.00231	0.00034	0.00011	0.00435	0.00375	0.00034	0.00011	0.00011	0.00011
Xylenes, Total	1.0E+01	0.00026	0.00095	0.000352	0.00026	0.000301	0.00095	0.00026	0.00026	0.00026

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**Appendix G. Summary of Groundwater Analytical Data
Landmark Shopping Center
Houston, Texas**

Analyte	Tier 1 ^{GW} GW _{ing} PCL	MW-10	MW-10	MW-10	MW-10	MW-11	MW-11	MW-11	MW-11	MW-12
		7/15/2008	3/30/2011	6/28/2011	11/8/2011	7/15/2008	3/30/2011	6/29/2011	11/8/2011	7/15/2008
Benzene	5.0E-03	0.00018	0.00929	0.000378	0.00008	0.00018	0.00008	0.00008	0.00008	0.00018
cis-1,2-Dichloroethene	7.0E-02	0.00461	0.0263	0.0221	0.000158	0.00291	0.00006	0.00006	0.00006	0.0471
Ethylbenzene	7.0E-01	0.00014	0.00011	0.00011	0.00011	0.00014	0.00011	0.00011	0.00011	0.00014
Tetrachloroethene	5.0E-03	0.0141	0.0887	0.00789	0.00013	0.0551	0.00738	0.000862	0.000712	0.0933
Toluene	1.0E+00	0.00012	0.00015	0.00015	0.00015	0.00012	0.00015	0.00015	0.00015	0.00012
Trichloroethene	5.0E-03	0.00419	0.0164	0.00797	0.00018	0.00198	0.000305	0.00018	0.00018	0.0171
Vinyl chloride	2.0E-03	0.00014	0.00011	0.00011	0.00011	0.00014	0.00011	0.00011	0.00011	0.00193
Xylenes, Total	1.0E+01	0.00026	0.00026	0.00026	0.00026	0.00026	0.00026	0.00026	0.00026	0.00026

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**Appendix G. Summary of Groundwater Analytical Data
Landmark Shopping Center
Houston, Texas**

Analyte	Tier 1 ^{GW} GW _{ing} PCL	MW-12	MW-12	MW-12	MW-13	MW-13	MW-13	MW-14	MW-14	MW-14
		3/30/2011	6/28/2011	11/9/2011	7/29/2008	3/29/2011	11/9/2011	7/15/2008	3/29/2011	6/29/2011
Benzene	5.0E-03	1.16	0.00008	0.000107 J	0.00018	0.00008	0.00008	0.00018	0.00008	0.00008
cis-1,2-Dichloroethene	7.0E-02	0.0003	0.132	0.152	0.00101	0.00006	0.00006	0.00015	0.00006	0.00006
Ethylbenzene	7.0E-01	0.658	0.00011	0.00011	0.00014	0.00011	0.00011	0.00014	0.00011	0.000154
Tetrachloroethene	5.0E-03	0.00105	0.155	0.214	0.706	0.000155	0.0466	0.00018	0.00013	0.00013
Toluene	1.0E+00	0.544	0.00015	0.00015	0.00012	0.00015	0.00015	0.00012	0.00015	0.000451
Trichloroethene	5.0E-03	0.0009	0.0422	0.0475	0.0199	0.00018	0.00113	0.00014	0.00018	0.00018
Vinyl chloride	2.0E-03	0.00055	0.013	0.00749	0.00014	0.00011	0.00011	0.00014	0.00011	0.00011
Xylenes, Total	1.0E+01	1.48	0.00026	0.00026	0.00026	0.00026	0.00026	0.00026	0.00026	0.00026

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**Appendix G. Summary of Groundwater Analytical Data
Landmark Shopping Center
Houston, Texas**

Analyte	Tier 1 ^{GW} GW _{ing} PCL	MW-14	MW-15	MW-15	MW-15	MW-16	MW-16	MW-16	MW-16	MW-17
		11/9/2011	3/30/2011	6/29/2011	11/8/2011	9/23/2008	3/29/2011	6/28/2011	11/8/2011	3/30/2011
Benzene	5.0E-03	0.000416 J	0.0333	0.000781	0.00008	0.00013	0.000101	0.00008	0.00008	0.00008
cis-1,2-Dichloroethene	7.0E-02	0.000365 J	0.00406	0.000829	0.000467	0.016	0.00732	0.00185	0.00006	0.00006
Ethylbenzene	7.0E-01	0.00011	0.000247	0.00011	0.00011	0.00013	0.00011	0.00011	0.00011	0.00011
Tetrachloroethene	5.0E-03	0.000646 J	0.000587	0.000782	0.000229	0.051	0.0144	0.0047	0.00013	0.00013
Toluene	1.0E+00	0.00015	0.000535	0.00015	0.00015	0.00014	0.000389	0.00015	0.00015	0.00015
Trichloroethene	5.0E-03	0.000209 J	0.00136	0.000451	0.000303	0.018	0.00699	0.00212	0.000288	0.00018
Vinyl chloride	2.0E-03	0.00011	0.00011	0.00011	0.00011	0.00013	0.00011	0.00011	0.00011	0.00011
Xylenes, Total	1.0E+01	0.00026	0.000758	0.00026	0.00026	0.00032	0.00026	0.00026	0.00026	0.00026

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**Appendix G. Summary of Groundwater Analytical Data
Landmark Shopping Center
Houston, Texas**

Analyte	Tier 1 ^{GW} GW _{ing} PCL	MW-17	MW-17	MW-18	MW-18	MW-18	MW-19	MW-19	MW-19	MW-19
		6/29/2011	11/8/2011	9/23/2008	3/29/2011	11/9/2011	5/11/2009	3/30/2011	6/29/2011	11/8/2011
Benzene	5.0E-03	0.00008	0.00008	0.00013	0.00008	0.00008	0.00013	0.00008	0.00008	0.00008
cis-1,2-Dichloroethene	7.0E-02	0.00006	0.00006	0.00016	0.00006	0.00006		0.00006	0.000162	0.00006
Ethylbenzene	7.0E-01	0.00011	0.00011	0.00013	0.00011	0.00011	0.00013	0.00011	0.00011	0.00011
Tetrachloroethene	5.0E-03	0.00126	0.00013	0.00008	0.0141	0.00013	0.00008	0.000925	0.00094	0.000235
Toluene	1.0E+00	0.00015	0.00015	0.00014	0.00015	0.00015	0.00014	0.00015	0.00015	0.00015
Trichloroethene	5.0E-03	0.00018	0.00018	0.00013	0.000306	0.00018	0.00013	0.00018	0.00018	0.00018
Vinyl chloride	2.0E-03	0.00011	0.00011	0.00013	0.00011	0.00011	0.00013	0.00011	0.00011	0.00011
Xylenes, Total	1.0E+01	0.00026	0.00026	0.00032	0.00026	0.00026	0.00032	0.00026	0.00026	0.00026

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**Appendix G. Summary of Groundwater Analytical Data
Landmark Shopping Center
Houston, Texas**

Analyte	Tier 1 ^{GW} GW _{ing} PCL	MW-20	MW-20	MW-20	MW-20
		5/11/2009	3/30/2011	6/30/2011	11/8/2011
Benzene	5.0E-03	0.00013	0.00008	0.00008	0.000178 J
cis-1,2-Dichloroethene	7.0E-02		0.00006	0.00006	0.00006
Ethylbenzene	7.0E-01	0.00013	0.00011	0.00011	0.00011
Tetrachloroethene	5.0E-03	0.00008	0.00013	0.000163	0.00013
Toluene	1.0E+00	0.00014	0.00015	0.00015	0.00015
Trichloroethene	5.0E-03	0.00013	0.00018	0.00018	0.00018
Vinyl chloride	2.0E-03	0.00013	0.00011	0.00011	0.00011
Xylenes, Total	1.0E+01	0.00032	0.00026	0.00026	0.00026

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Appendix G. Summary of Groundwater Analytical Data Landmark Shopping Center Houston, Texas

Notes

All concentrations are shown in milligrams per liter (mg/L)

NA – Not analyzed

Tier 1 GWGW_{ing} PCL - Tier 1 Commercial/Industrial Protective Concentration Level for Ingestion of Class 1 or 2 groundwater, published by TCEQ May 2011.

<1.1 - Constituent not detected at sample quantitation limit shown

^{GW}GW_{ing}. PCLs for ingestion groundwater

Bold - Indicates constituent detected above the sample quantitation limit.

Blue shading - indicates the detected concentration exceeds the Tier 1 ^{GW}GW_{ing}. PCL

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**Appendix G. Geochemical Data
Former Landmark Shopping Center
Houston, Texas**

	Sample ID	MW-2	MW-2	MW-3	MW-3	MW-5	MW-5	MW-8	MW-8	MW-20	MW-20
	Sample Date	3/31/2011	6/30/2011	3/30/2011	6/30/2011	3/30/2011	6/30/2011	3/30/2011	6/30/2011	3/30/2011	6/30/2011
Analyte	Units										
Chloride	mg/L	94.7	102	108	127	33.2	37	44.3	43.5	42.3	39.5
Nitrate as N	mg/L	0.483	0.469	0.295	0.279	0.993	0.554	<0.0500	<0.0500	1.32	1.15
Nitrate Nitrite as N	mg/L	0.483	0.469	0.295	0.279	0.993	0.554	<0.0500	<0.0500	1.32	1.15
Nitrite as N	mg/L	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
Sulfate	mg/L	35.7	37.9	33.3	35.2	18.1	19.1	20.5	19.6	23.8	22.8
Alkalinity	mg/L	387	379	321	306	286	271	382	375	317	294
Total Dissolved Solids	mg/L	654	611	613	699	260	416	511	606	368	424
Total Organic Carbon	mg/L	1.05	0.703	0.414	0.495	0.303	0.592	0.795	0.901	0.564	0.668
Acetylene	ug/L	<0.500	<0.50	<0.500	<0.50	<0.500	<0.50	<0.500	<0.50	<0.500	<0.50
Carbon dioxide	ug/L	95700	127000	69300	71800	50100	49800	106000	108000	83200	72800
Ethane	ug/L	0.052	<0.025	<0.025	0.005	0.089	<0.025	0.094	0.027	<0.025	<0.025
Ethene	ug/L	0.085	0.02	0.04	0.023	0.05	0.019	0.13	0.066	<0.025	0.016
Methane	ug/L	0.24	0.097	0.2	0.52	0.14	0.42	710	320	0.47	3
Calcium	mg/L	125	147	120	130	75.5	85.2	117	128	106	107
Iron	mg/L	0.45	4.79	0.228	<0.0866	<0.0866	0.596	0.477	0.545	0.117	<0.0866
Magnesium	mg/L	20.4	23.5	12.9	12.1	11.4	12.6	12.5	12.8	10.1	9.98
Manganese	mg/L	0.0072	0.345	0.0235	0.0462	0.0035	0.0578	1.22	1.17	2.82	1.21
Potassium	mg/L	1.37	3.13	0.977	1.1	0.907	1.23	0.581	0.663	0.756	0.781
Sodium	mg/L	77.9	75.4	71	78	56.9	56.5	63	60.6	50.9	43.2
Iron-dissolved	mg/L	<0.0866	0.131	<0.0866	0.0966	<0.0866	0.101	<0.0866	0.0921	<0.0866	<0.0866
Manganese - dissolved	mg/L	<0.000840	0.129	0.0048	0.0459	<0.000840	<0.000840	0.978	1.09	0.521	1.02

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Appendix G. Water Level Data
Landmark Shopping Center
Houston, Texas

Monitoring Well	Date Installed	Date Measured	Total Depth (ft BTOC)	Screened Interval (ft BGS)	Ground Surface Elevation (ft MSL)	Top of Casing Elevation (ft)	Depth to Water (ft BTOC)	Water Level Elevation (ft MSL)				
MW-1	7/2/04	7/6/04	28.90	9'-29'	71.15	70.79	12.62	58.17	drop since March 2011			
		9/17/04	NM				15.89	54.90				
		7/15/08	NM				16.35	54.44				
		3/29/11	27.61				16.57	54.22		0.68		
		6/28/11	21.61				17.98	52.81		1.41		
		11/8/11	NM	19.25	51.54	2.68						
MW-2	7/2/04	7/6/04	28.10	8'-28'	71.17	70.72	12.33	58.39				
		9/17/04	NM				15.67	55.05				
		3/29/11	27.70				16.40	54.32		0.73		
		6/28/11	27.70				17.82	52.90		1.42		
							11/8/11	NM		19.95	50.77	3.55
MW-3	7/2/04	7/6/04	29.20	9'-29'	70.95	70.55	12.48	58.07				
		9/17/04	NM				15.61	54.94				
		3/29/11	27.20				16.27	54.28		0.66		
		6/28/11	29.01				17.91	52.64		1.64		
							11/8/11	NM		18.70	51.85	2.43
MW-4	7/2/04	7/6/04	26.40	8.5'-28.5'	71.10	70.76	12.12	58.64				
		9/17/04	NM				15.42	55.34				
		3/29/11	27.96				16.21	54.55		0.79		
		6/28/11	27.96				17.65	53.11		1.44		
							11/8/11	NM		18.80	51.96	2.59
MW-5	9/15/04	9/17/04	29.00	9'-29'	71.57	71.73	19.10	52.63				
		3/29/11	29.07				19.75	51.98				
		6/28/11	29.10				20.93	50.80		0.65		
							11/8/11	NM		22.36	49.37	1.18
												2.61
MW-6	9/15/04	9/17/04	30.00	10'-30'	71.02	70.55	15.82	54.73				
		3/29/11	26.93				16.50	54.05				
		6/28/11	29.25				17.51	53.04		0.68		
							11/8/11	NM		19.17	51.38	1.01
												2.67
MW-7	9/15/04	9/17/04	27.50	7.5'-27.5'	70.86	70.45	14.76	55.69				
		3/29/11	26.93				15.45	55.00				
		6/28/11	29.94				16.95	53.50		0.69		
							11/8/11	NM		18.64	51.81	1.50
												3.19
MW-8	12/19/06	7/15/08	35.00	15'-35'	71.35	70.42	16.85	53.57				
		3/29/11	34.02				17.19	53.23				
		6/28/11	34.20				18.58	51.84		0.34		
							11/8/11	NM		19.83	50.59	1.39
												2.64
MW-9	12/19/06	7/15/08	45.00	15'-45'	71.06	70.33	18.45	51.88				
		3/29/11	44.05				19.16	51.17				
		6/28/11	44.10				20.34	49.99		0.71		
							11/8/11	NM		21.72	48.61	1.18
												2.56
MW-10	2/18/08	7/15/08	49.00	9'-49'	71.12	70.77	19.56	51.21				
		3/29/11	48.53				19.79	50.98				
		6/28/11	48.55				19.93	50.84		0.23		
							11/8/11	NM		22.25	48.52	0.14
												2.46
MW-11	2/18/08	7/15/08	49.00	9'-49'	70.89	70.58	18.99	51.59				
		3/29/11	48.13				19.93	50.65				
		6/28/11	48.15				21.02	49.56		0.94		
							11/8/11	NM		22.37	48.21	1.09
												2.44
MW-12	2/18/08	7/15/08	34.00	9'-34'	71.98	71.54	16.31	55.23				
		3/29/11	16.42				15.91	55.63				
		6/28/11	33.73				17.80	53.74		-0.40		
							11/8/11	NM		19.15	52.39	1.89
												3.24

ARCADIS
Appendix G. Water Level Data
Landmark Shopping Center
Houston, Texas

Monitoring Well	Date Installed	Date Measured	Total Depth (ft BTOC)	Screened Interval (ft BGS)	Ground Surface Elevation (ft MSL)	Top of Casing Elevation (ft)	Depth to Water (ft BTOC)	Water Level Elevation (ft MSL)	
MW-13	7/30/08	7/30/08	60.00	10'-60'	69.36	69.01	13.29	55.72	drop since March 2011 1.21 Could not access, gates locked 2.74
		3/29/11	28.05				14.50	54.51	
		6/28/11	NM				See Note 3	51.77	
		11/8/11	NM						
MW-14	2/18/08	7/15/08	47.00	17'-47'	71.04	70.56	17.00	53.56	0.34 1.40 2.94
		3/29/11	40.45				17.34	53.22	
		6/28/11	40.10				18.74	51.82	
		11/8/11	NM				20.28	50.28	
MW-15	9/12/08	3/29/11	45.38	17'-49'	70.21	69.94	19.30	50.64	dedicated bailer 0.11 2.49
		6/28/11	45.40				19.41	50.53	
		11/8/11	NM				21.79	48.15	
MW-16	9/12/08	3/29/11	47.37	9'-49'	71.14	70.88	20.61	50.27	dedicated bailer 0.44 2.37
		6/28/11	47.40				21.05	49.83	
		11/8/11	NM				22.98	47.90	
MW-17	9/22/08	3/29/11	35.56	9'-39'	71.30	71.37	21.24	50.13	0.97 2.35
		6/28/11	35.65				22.21	49.16	
		11/8/11	NM				23.59	47.78	
MW-18	9/22/08	3/29/11	29.22	9'-34'	69.84	69.43	15.10	54.33	Could not access, gates locked 2.38
		6/28/11	NM				See Note 3	51.95	
		11/8/11	NM						
MW-19	4/22/09	3/29/11	55.48	5'-62'	70.68	70.79	21.04	49.75	dedicated bailer 0.98 2.20
		6/28/11	55.61				22.02	48.77	
		11/8/11	NM				23.24	47.55	
MW-20	4/22/09	3/29/11	56.18	5'-62'	70.10	70.01	19.82	50.19	dedicated bailer 1.07 2.44
		6/28/11	56.18				20.89	49.12	
		11/8/11	NM				22.26	47.75	

average drop 2004 or 2008 thru 3/2011 0.59
average drop mar-jun 2011 1.13
average drop mar-nov 2011 2.65

Notes:

NM - Not Measured

ft = feet

BGS = below ground surface

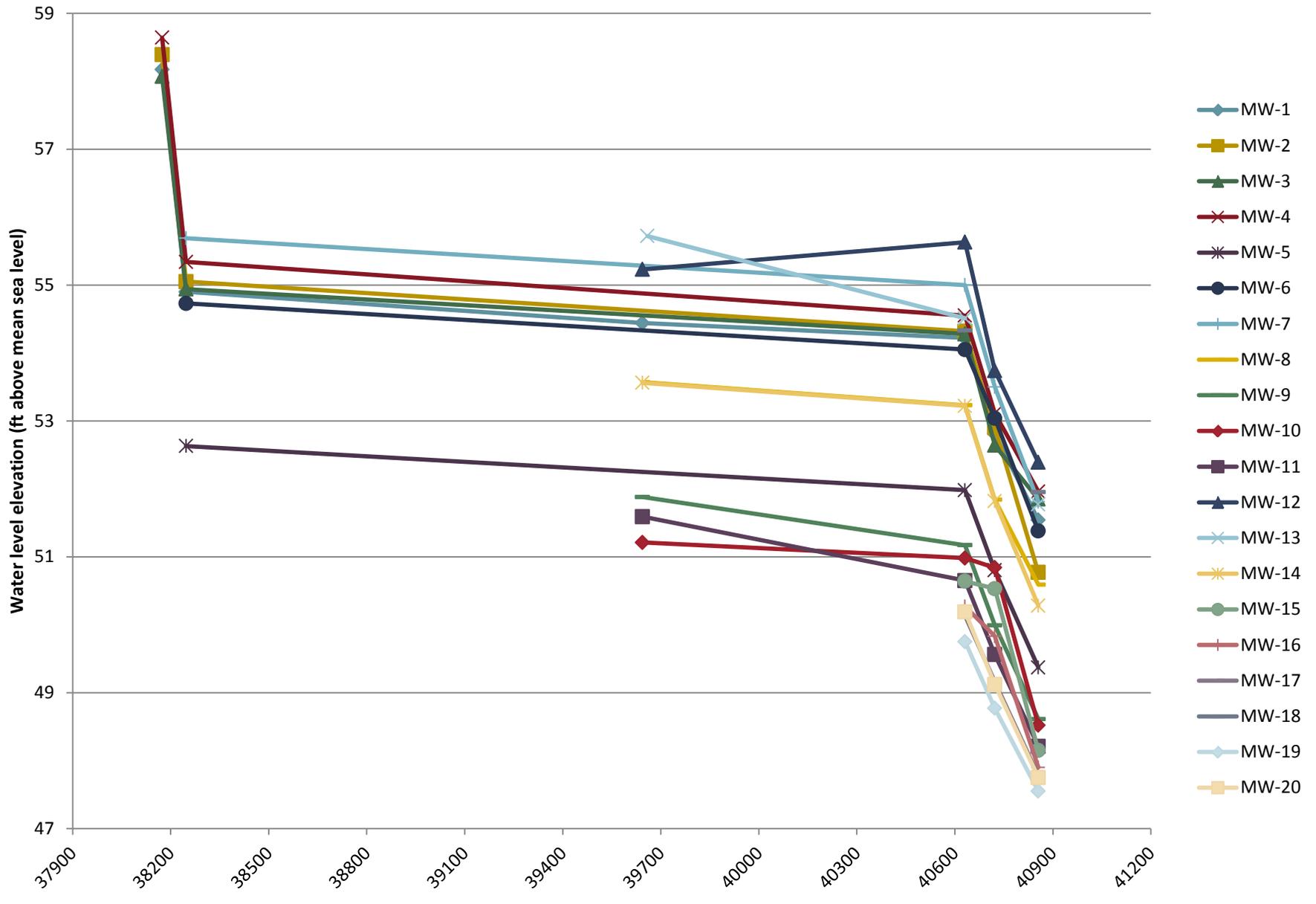
BTOC = below top of casing

MSL = mean sea level

1. Prior to the March 2011 event, data were collected by a consultant other than ARCADIS. average elev 11/11 47.63
2. Ground Surface and Top of Casing Elevations from Kuo and Associates survey conducted June 2011.
3. During June 2011 Gauging Event, MW-13 and MW-18 could not be accessed due to a locked construction gate.

average elev 2004 54.75
average elev 3/11 52.66
average elev 6/11 51.33

Water level elevations over time



Evaluation of Plume Stability

Landmark Shopping Center
5858 South Gessner Road
Houston, Texas

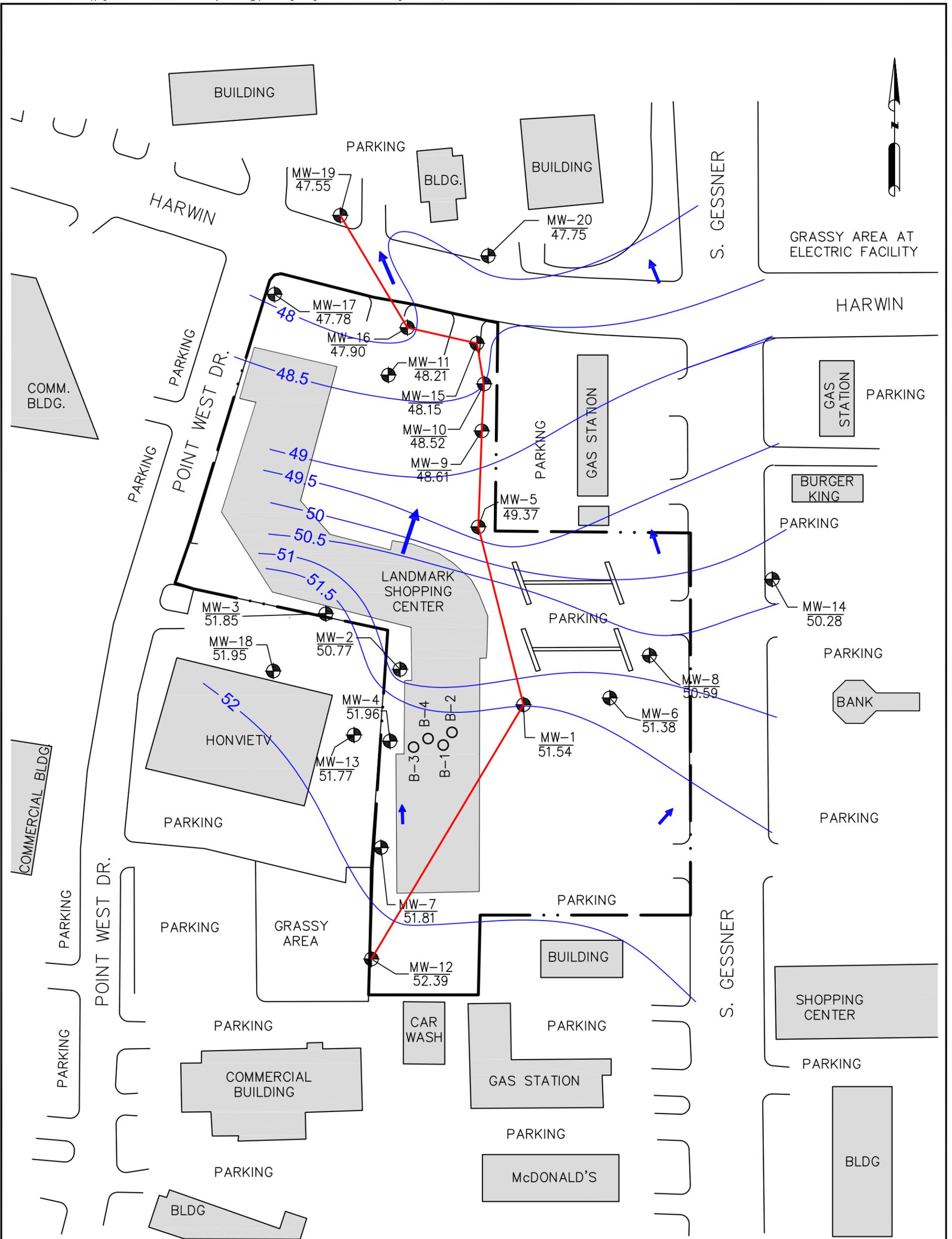
The most recent potentiometric surface and implied groundwater flow direction is shown in Figure 1. The groundwater flow direction ranges from northeast at the southern boundary of the site with a transition to a northwest flow direction near the geographic center of the site.

The constituents of concern include tetrachloroethene (PCE) and the daughter products of reductive dehalogenation trichloroethylene (TCE), Cis-1,2 dichloroethene (DCE), and vinyl chloride. Isoconcentration maps illustrating the distribution of these constituents are shown on Figures 2, 3, 4, and 5 respectively. The center or core of the chlorinated volatile organic compounds (VOC) mass at the site is near MW-1.

The presence of the daughter products of the reductive dehalogenation of PCE in the groundwater at the site is a primary indicator that natural attenuation of the chlorinated VOCs is taking place. Biogeochemical data collected from monitoring wells at the site provide additional indications of a groundwater environment in which reductive dechlorination takes place. This includes the generation of total iron as high as 4.79 mg/L, the consumption of sulfate, the production of dissolved methane and carbon dioxide gas, and negative oxidation-reduction potential (ORP) values.

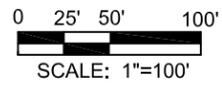
There are also empirical indications of natural attenuation of the chlorinated VOCs, including the decline of chlorinated VOC concentrations with distance from the source area. In some cases there is an increase in chlorinated VOC concentrations between 2004 and 2009, followed by declines in concentrations at significant rates between 2009 and 2011. Currently, concentrations in the core of the plume are still relatively elevated, but the dissolved plume emanating from that zone is attenuating.

The decline in chlorinated VOC concentrations over time can be used to calculate respective degradation half-lives. The degradation half-lives range from approximately 60 to 140 days in monitoring wells downgradient of the core of the plume. Evaluation of the attenuation with migration distance shows that the concentrations of PCE and TCE attenuate to concentrations below the respective Tier 1 Protective Concentration Levels (PCLs) at a minimum distance of about 200 feet from the northern site boundary (shown as the small blue circle on Figure 6), while cis-1,2-DCE and vinyl chloride attenuate to concentrations below their respective PCLs at distances of more than 800 feet from the down-gradient property boundary. The graph of constituents versus time for MW-16 (near the property boundary) shows a continually declining trend, meaning that with time the chlorinated VOC plume will retreat further back from the down-gradient property boundary. In fact, concentrations in down-gradient wells MW-10 and MW-11 have already dropped below the Tier 1 GWGWing PCLs showing that the plume boundary has already begun to retreat. This information confirms that the plume is not only stable, but declining in overall mass and lateral extent. Furthermore, this information demonstrates that natural attenuation should prevent down-gradient migration of constituents beyond the boundary of the proposed Municipal Setting Designation.



LEGEND

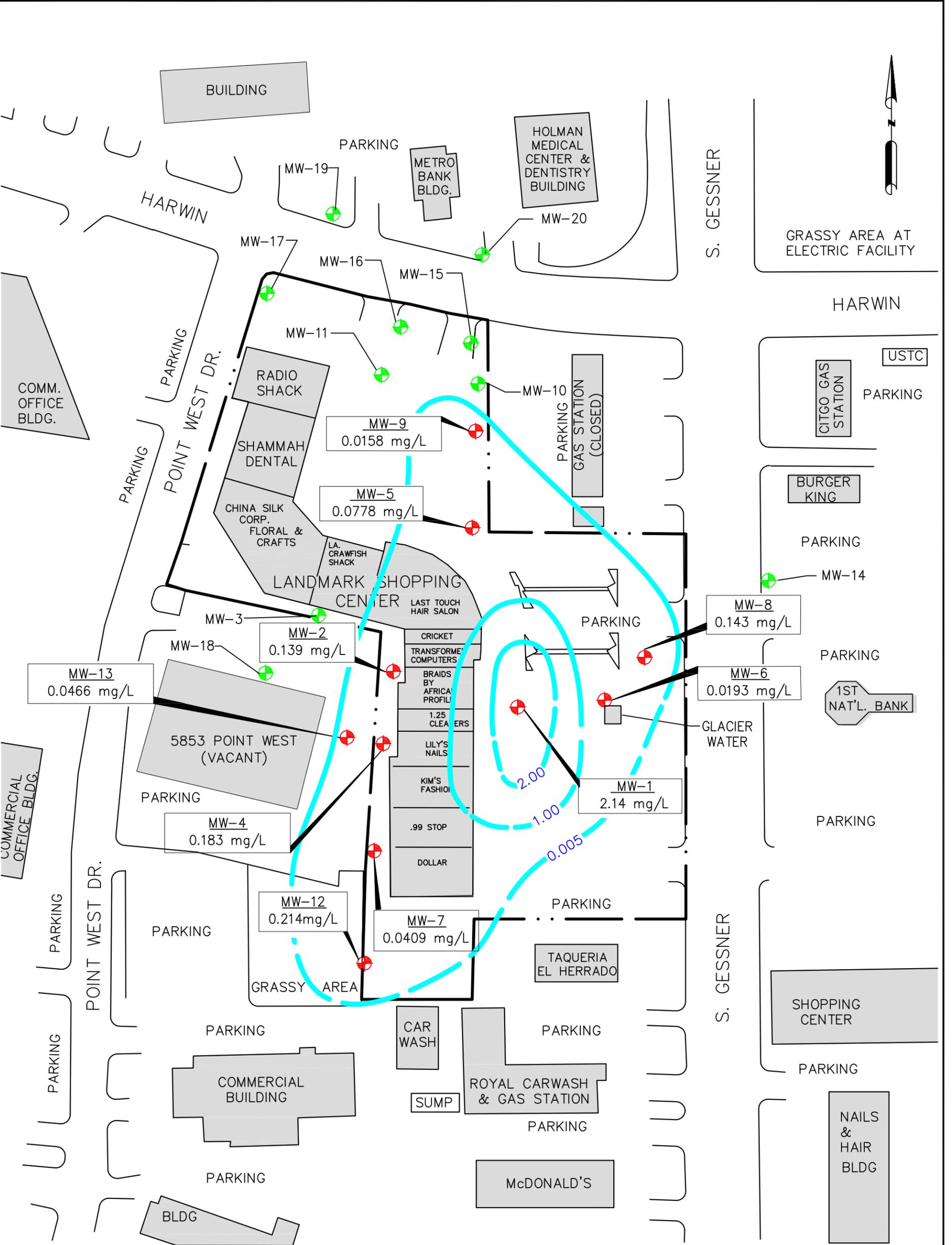
- MW-5 49.37 MONITORING WELL LOCATION & ID
GROUNDWATER ELEVATIONS (MEASURED AT WELL)
- APPROXIMATE PROPERTY BOUNDARY
- EXISTING STRUCTURE
- B-1 APPROXIMATE BORING LOCATION & ID
(BUCHANAN ENVIRONMENTAL ASSOC., JULY 2009)
- GROUNDWATER FLOW DIRECTION
- POTENTIOMETRIC CONTOURS (0.5' INTERVALS)
- FLOW PATH USED FOR GRAPH OF CONCENTRATION
VS. DISTANCE (SEE FIGURE 6)



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 2nd QUARTER GROUNDWATER MONITORING REPORT

**POTENTIOMETRIC SURFACE MAP
 NOVEMBER 2011**

ARCADIS | FIGURE **1**



LEGEND / NOTES

NOTE: TIER 1 RESIDENTIAL PROTECTIVE CONCENTRATION LEVEL = 0.005 mg/L

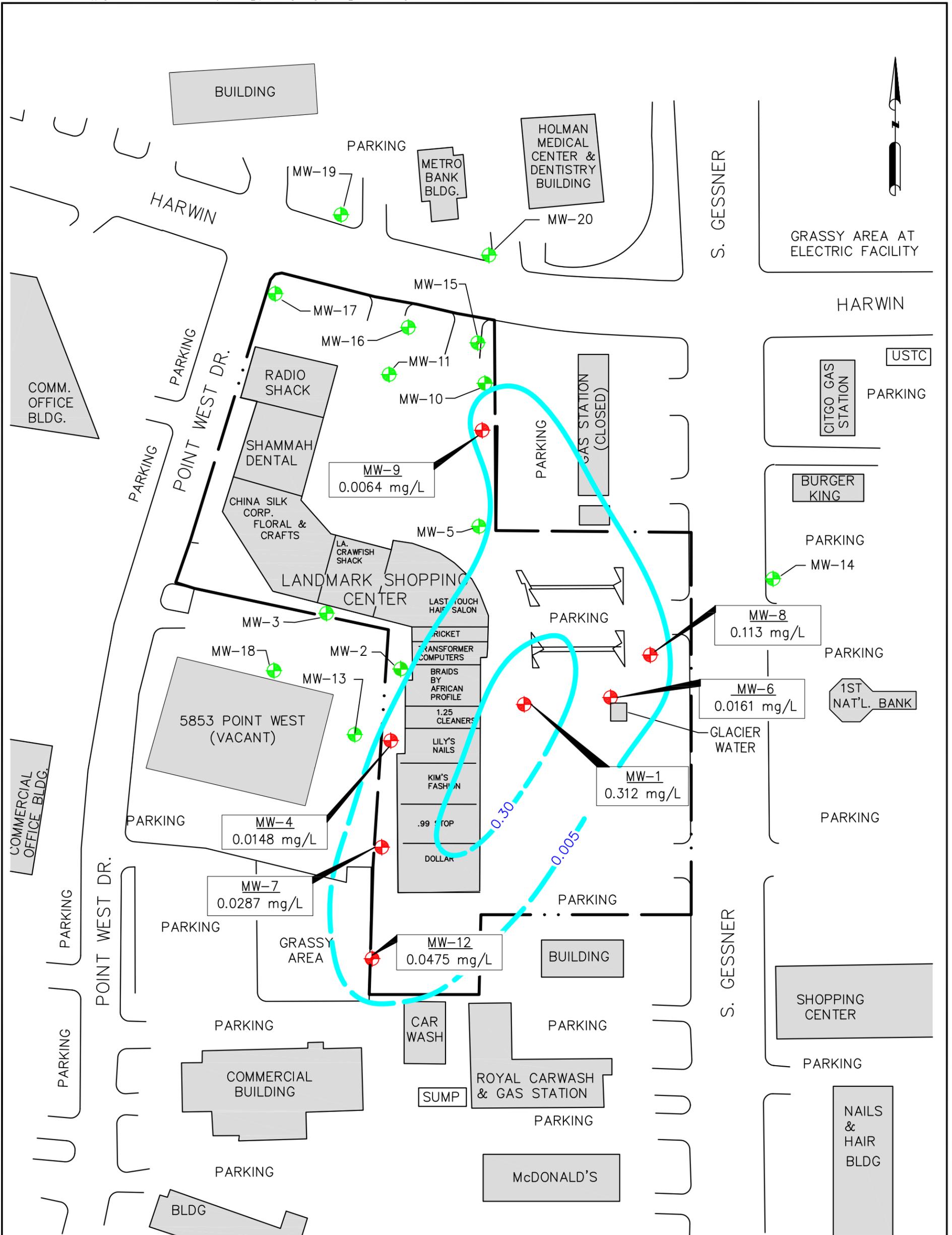
-  MONITORING WELL WITH TETRACHLOROETHENE CONCENTRATION < 0.005 mg/L
-  MONITORING WELL WITH TETRACHLOROETHENE CONCENTRATION > 0.005 mg/L
-  1.00 TETRACHLOROETHENE CONCENTRATION CONTOUR
-  APPROXIMATE PROPERTY BOUNDARY
-  EXISTING STRUCTURE

0 25' 50' 100'
 SCALE: 1"=100'

LANDMARK SHOPPING CENTER
 5858 SOUTH GESSNER ROAD
 HOUSTON, TEXAS

**ISOCONCENTRATION MAP
 TETRACHLOROETHENE
 IN GROUNDWATER- NOVEMBER 2011**

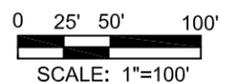




LEGEND / NOTES

NOTE: TIER 1 RESIDENTIAL PROTECTIVE CONCENTRATION LEVEL = 0.005 mg/L

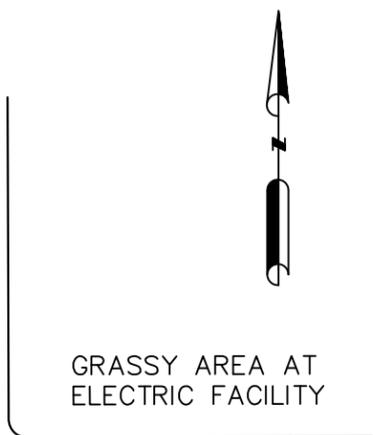
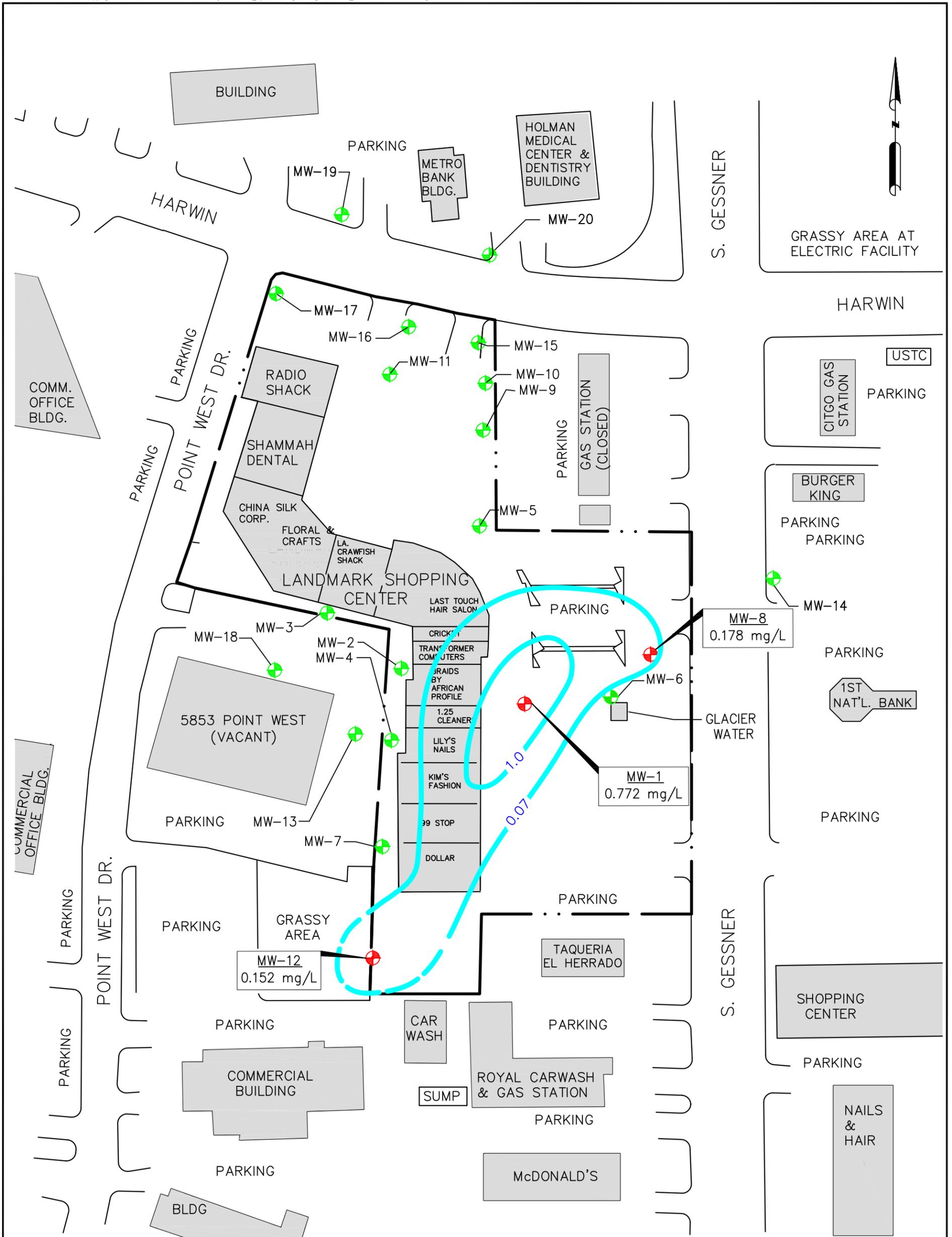
-  MONITORING WELL WITH TRICHLOROETHENE CONCENTRATION < 0.005 mg/L
-  MONITORING WELL WITH TRICHLOROETHENE CONCENTRATION > 0.005 mg/L
-  TRICHLOROETHENE CONCENTRATION CONTOUR
-  APPROXIMATE PROPERTY BOUNDARY
-  EXISTING STRUCTURE



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 HOUSTON, TEXAS

**ISOCONCENTRATION MAP
 TRICHLOROETHENE IN GROUNDWATER
 NOVEMBER 2011**





LEGEND / NOTES

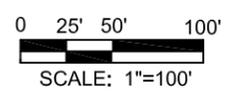
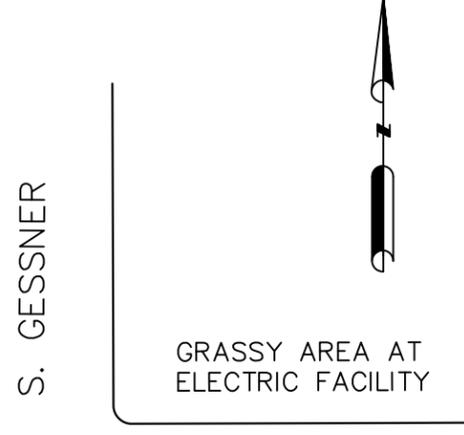
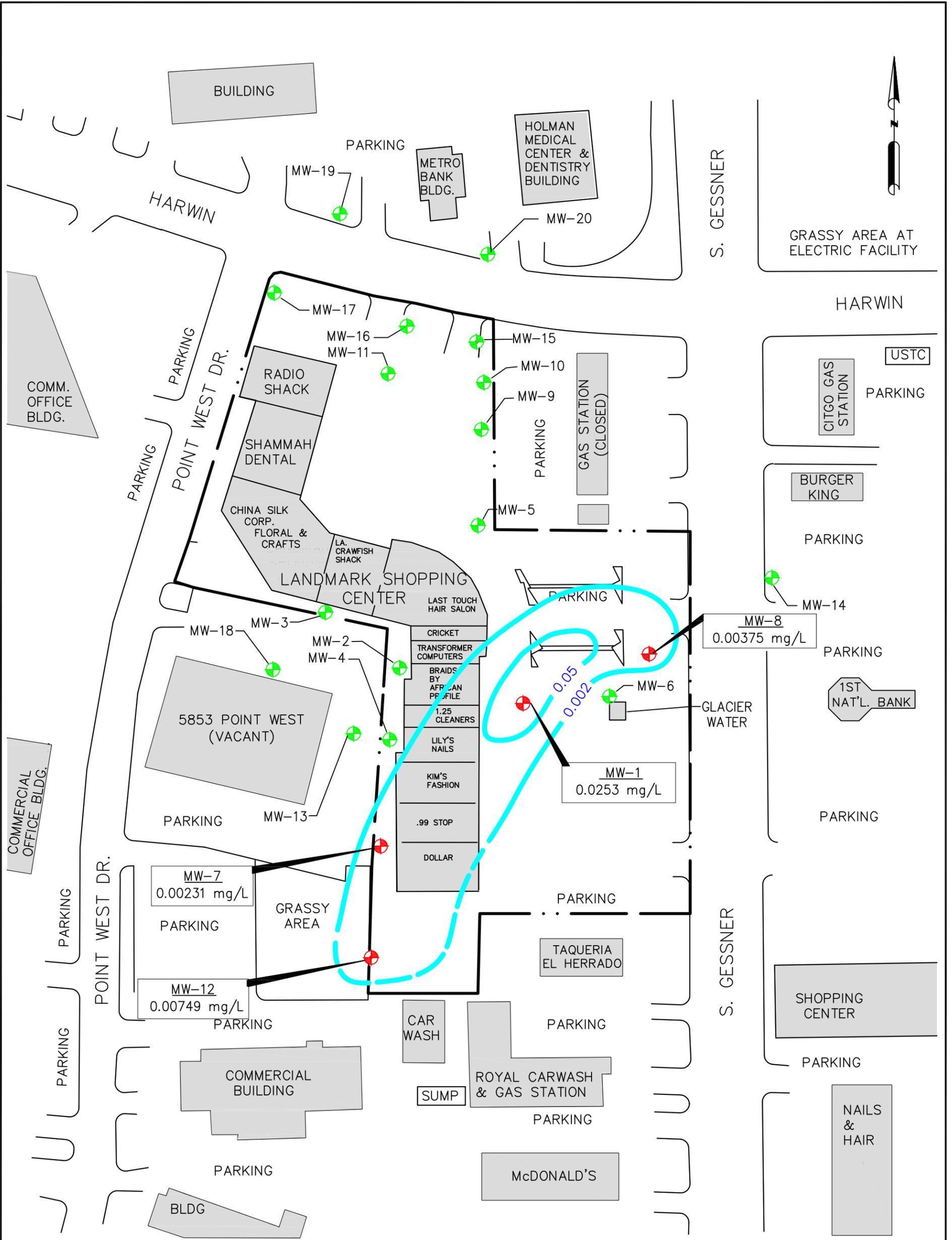
NOTE: TIER 1 RESIDENTIAL PROTECTIVE CONCENTRATION LEVEL = 0.07 mg/L

-  MONITORING WELL WITH CIS- 1,2 DICHLOROETHENE CONCENTRATION < 0.07 mg/L
-  MONITORING WELL WITH CIS- 1,2 DICHLOROETHENE CONCENTRATION > 0.07 mg/L
-  CIS- 1,2 DICHLOROETHENE CONCENTRATION CONTOUR
-  APPROXIMATE PROPERTY BOUNDARY
-  EXISTING STRUCTURE

LANDMARK SHOPPING CENTER
 5858 SOUTH GESSNER ROAD
 HOUSTON, TEXAS

**ISOCONCENTRATION MAP
 CIS- 1,2 DICHLOROETHENE
 IN GROUNDWATER- NOVEMBER 2011**





LEGEND / NOTES

NOTE: TIER 1 RESIDENTIAL PROTECTIVE CONCENTRATION LEVEL = 0.002 mg/L

- MONITORING WELL WITH VINYL CHLORIDE CONCENTRATION < 0.002 mg/L
- MONITORING WELL WITH VINYL CHLORIDE CONCENTRATION > 0.002 mg/L
- 0.05 VINYL CHLORIDE CONCENTRATION CONTOUR
- APPROXIMATE PROPERTY BOUNDARY
- EXISTING STRUCTURE

LANDMARK SHOPPING CENTER
 5858 SOUTH GESSNER ROAD
 HOUSTON, TEXAS

**ISOCONCENTRATION MAP
 VINYL CHLORIDE IN GROUNDWATER
 NOVEMBER 2011**

ARCADIS

FIGURE **5**

Figure 6. Chlorinated VOC Concentrations over Distance

