# WASTE MATERIAL AND VISUALLY-IMPACTED SOILS

**Legend**

- 2008 Drilling
- Barn Samples
- Pepsi Area 3 Soil Samples
- Pepsi Area 5 Soil Samples
- Pepsi Area 6 Soil Samples
- BB-BB-xx Holes
- BH Soil Samples
- MW Holes
- QUAD Samples
- SB Soil Samples
- CDOT Holes
- Pepsi UT (Utility Trenches) Soil Locations

**Areal Soil Samples with Addresses**

- Parking Restrictor
- 3801 Brighton Blvd
- 4301 Brighton Blvd
- 4375 Brighton Blvd
- 4600 Humbolt

As concentrations exceeding 15 ppm background limit (red)

Depth (ft) - Concentration (ppm)

0 125 250 500
Feet

1 inch = 250 feet

N

Figure 10

# Arsenic Soil Sample Concentrations 0 to 5 feet

VB/I-70 Remedial Investigation

EMSI Engineering Support Management, Inc.

**Legend**

- 2008 Drilling
- Barn Samples
- Pepsi Area 3 Soil Samples
- Pepsi Area 5 Soil Samples
- Pepsi Area 6 Soil Samples
- BB-BB-xx Holes
- BH Soil Samples
- MW Holes
- QUAD Samples
- SB Soil Samples
- CDOT Holes
- Pepsi UT (Utility Trenches) Soil Locations

As concentrations exceeding 15 ppm background limit (red)

Depth (ft) - Concentration (ppm)

0 125 250 500
Feet

1 inch = 250 feet

N

Figure 12

# Arsenic Soil Sample Concentrations 5 to 10 feet

## VB/I-70 Remedial Investigation

EMSI Engineering Support Management, Inc.

**Legend**

- 2008 Drilling
- Barn Samples
- Pepsi Area 3 Soil Samples
- Pepsi Area 5 Soil Samples
- Pepsi Area 6 Soil Samples
- BB-BB-xx Holes
- BH Soil Samples
- MW Holes
- QUAD Samples
- SB Soil Samples
- CDOT Holes
- Pepsi UT (Utility Trenches) Soil Locations

As concentrations exceeding 15 ppm background limit (red)

Depth (ft) - Concentration (ppm)

0 125 250 500
Feet

1 inch = 250 feet

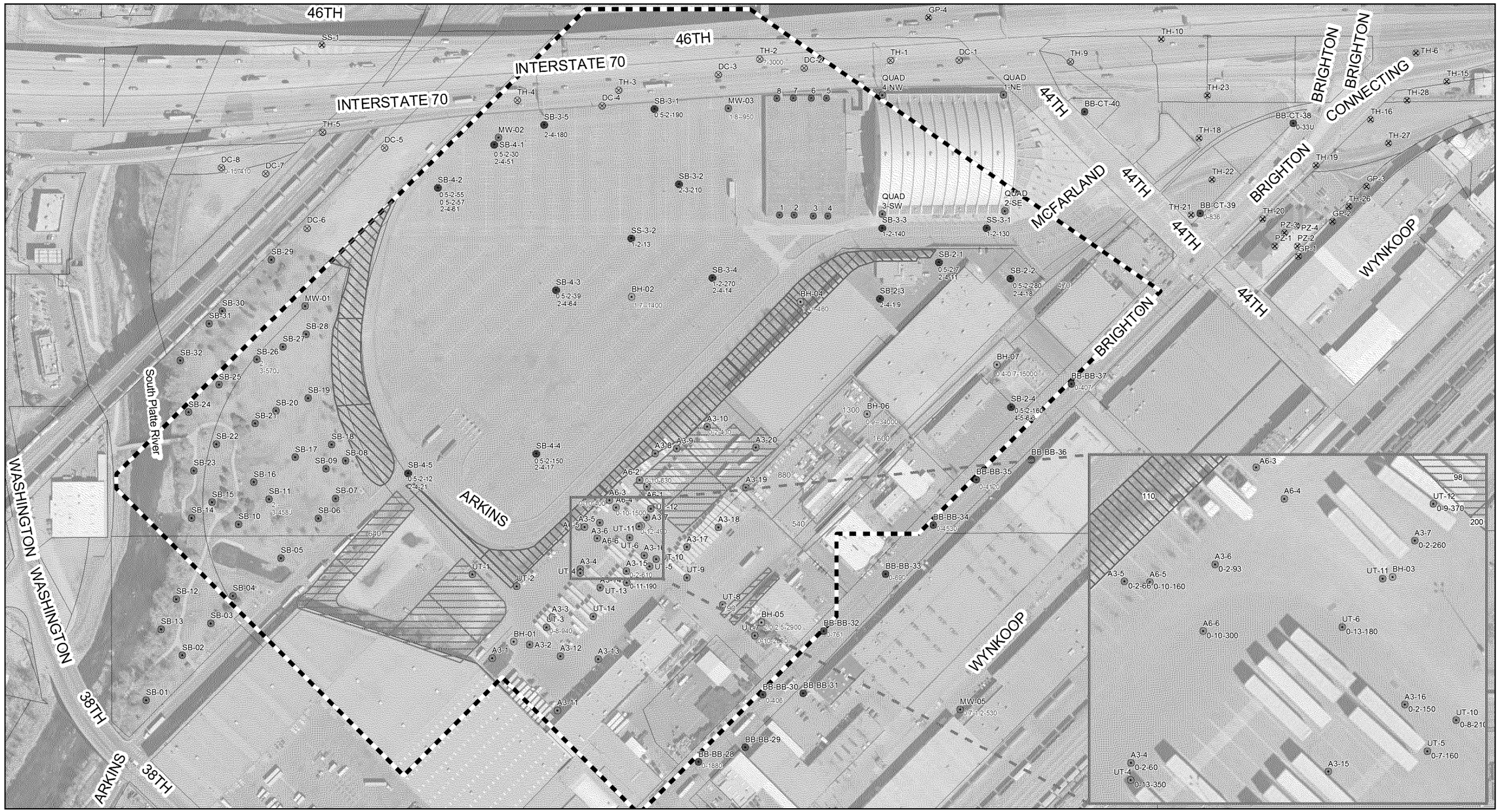
N

Figure 13

# Arsenic Soil Sample Concentrations 10 feet and Greater Depth

VB/I-70 Remedial Investigation

EMSI Engineering Support Management, Inc.




**Legend**

- 2008 Drilling
- Barn Samples
- Pepsi Area 3 Soil Samples
- Pepsi Area 5 Soil Samples
- Pepsi Area 6 Soil Samples
- BB-BB-xx Holes
- BH Soil Samples
- MW Holes
- QUAD Samples
- SB Soil Samples
- CDOT Holes
- Pepsi UT (Utility Trenches) Soil Locations

**Areal Soil Samples with Addresses**

- Parking Restrictor
- 3801 Brighton Blvd
- 4301 Brighton Blvd
- 4375 Brighton Blvd
- 4600 Humbolt

Pb concentrations exceeding 400 ppm background limit (red)

Depth (ft) - Concentration (ppm)

0 125 250 500
Feet
1 inch = 250 feet

N

Figure 11

# Lead Soil Sample Concentrations 0 to 5 feet

VB/I-70 Remedial Investigation

EMSI Engineering Support Management, Inc.

**Legend**

- 2008 Drilling
- Barn Samples
- Pepsi Area 3 Soil Samples
- Pepsi Area 5 Soil Samples
- Pepsi Area 6 Soil Samples
- BB-BB-xx Holes
- BH Soil Samples
- MW Holes
- QUAD Samples
- SB Soil Samples
- CDOT Holes
- Pepsi UT (Utility Trenches) Soil Locations

Pb concentrations exceeding 400 ppm background limit (red)

Depth (ft) - Concentration (ppm)

0 125 250 500
Feet
1 inch = 250 feet

N

Figure 14

# Lead Soil Sample Concentrations 5 to 10 feet

## VB/I-70 Remedial Investigation

EMSI Engineering Support Management, Inc.

**Legend**

- 2008 Drilling
- Barn Samples
- Pepsi Area 3 Soil Samples
- Pepsi Area 5 Soil Samples
- Pepsi Area 6 Soil Samples
- BB-BB-xx Holes
- BH Soil Samples
- MW Holes
- QUAD Samples
- SB Soil Samples
- CDOT Holes
- Pepsi UT (Utility Trenches) Soil Locations

Pb concentrations exceeding 400 ppm background limit (red)

Depth (ft) - Concentration (ppm)

0 62.5 125 250 375 500
Feet
1 inch = 250 feet

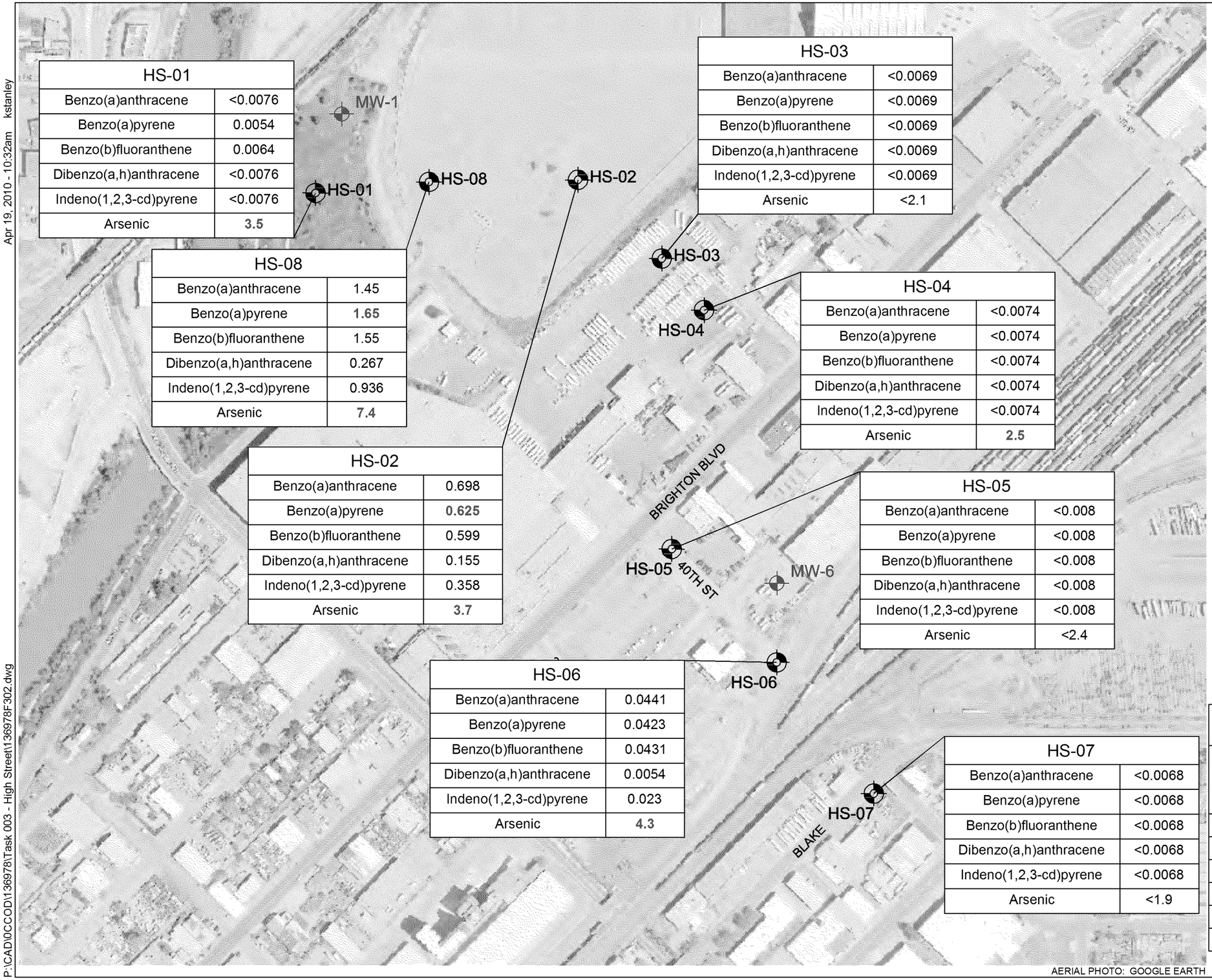
N

Figure 15

# Lead Soil Sample Concentrations 10 feet and Greater Depth

VB/I-70 Remedial Investigation

EMSI Engineering Support Management, Inc.




| HS-01 | |
|---|---|
| Benzo(a)anthracene | <0.0076 |
| Benzo(a)pyrene | 0.0054 |
| Benzo(b)fluoranthene | 0.0064 |
| Dibenzo(a,h)anthracene | <0.0076 |
| Indeno(1,2,3-cd)pyrene | <0.0076 |
| Arsenic | **3.5** |

| HS-08 | |
|---|---|
| Benzo(a)anthracene | 1.45 |
| Benzo(a)pyrene | **1.65** |
| Benzo(b)fluoranthene | 1.55 |
| Dibenzo(a,h)anthracene | 0.267 |
| Indeno(1,2,3-cd)pyrene | 0.936 |
| Arsenic | **7.4** |

| HS-02 | |
|---|---|
| Benzo(a)anthracene | 0.698 |
| Benzo(a)pyrene | **0.625** |
| Benzo(b)fluoranthene | 0.599 |
| Dibenzo(a,h)anthracene | 0.155 |
| Indeno(1,2,3-cd)pyrene | 0.358 |
| Arsenic | **3.7** |

| HS-03 | |
|---|---|
| Benzo(a)anthracene | <0.0069 |
| Benzo(a)pyrene | <0.0069 |
| Benzo(b)fluoranthene | <0.0069 |
| Dibenzo(a,h)anthracene | <0.0069 |
| Indeno(1,2,3-cd)pyrene | <0.0069 |
| Arsenic | <2.1 |

| HS-04 | |
|---|---|
| Benzo(a)anthracene | <0.0074 |
| Benzo(a)pyrene | <0.0074 |
| Benzo(b)fluoranthene | <0.0074 |
| Dibenzo(a,h)anthracene | <0.0074 |
| Indeno(1,2,3-cd)pyrene | <0.0074 |
| Arsenic | **2.5** |

| HS-05 | |
|---|---|
| Benzo(a)anthracene | <0.008 |
| Benzo(a)pyrene | <0.008 |
| Benzo(b)fluoranthene | <0.008 |
| Dibenzo(a,h)anthracene | <0.008 |
| Indeno(1,2,3-cd)pyrene | <0.008 |
| Arsenic | <2.4 |

| HS-06 | |
|---|---|
| Benzo(a)anthracene | 0.0441 |
| Benzo(a)pyrene | 0.0423 |
| Benzo(b)fluoranthene | 0.0431 |
| Dibenzo(a,h)anthracene | 0.0054 |
| Indeno(1,2,3-cd)pyrene | 0.023 |
| Arsenic | **4.3** |

| HS-07 | |
|---|---|
| Benzo(a)anthracene | <0.0068 |
| Benzo(a)pyrene | <0.0068 |
| Benzo(b)fluoranthene | <0.0068 |
| Dibenzo(a,h)anthracene | <0.0068 |
| Indeno(1,2,3-cd)pyrene | <0.0068 |
| Arsenic | <1.9 |

0 300' 600'
APPROXIMATE SCALE IN FEET

## LEGEND

HS-07 SOIL AND GROUNDWATER SAMPLE LOCATION

MW-6 EXISTING MONITORING WELL LOCATION

CSEV COLORADO SOIL EVALUATION VALUES

mg/kg MILLIGRAMS PER KILOGRAM

| REFERENCE STANDARD TABLE | |
|---|---|
| CONSTITUENT | WORKER CSEV EXCEEDANCE (mg/kg) |
| Benzo(a)anthracene | **3.9** |
| Benzo(a)pyrene | **0.39** |
| Benzo(b)fluoranthene | **3.9** |
| Dibenzo(a,h)anthracene | **0.39** |
| Indeno(1,2,3-cd)pyrene | **3.9** |
| Arsenic | **1.6** |

**BOLD RED** TEXT INDICATES EXCEEDANCE

AERIAL PHOTO: GOOGLE EARTH

Apr 19, 2010 - 10:32am kstanley

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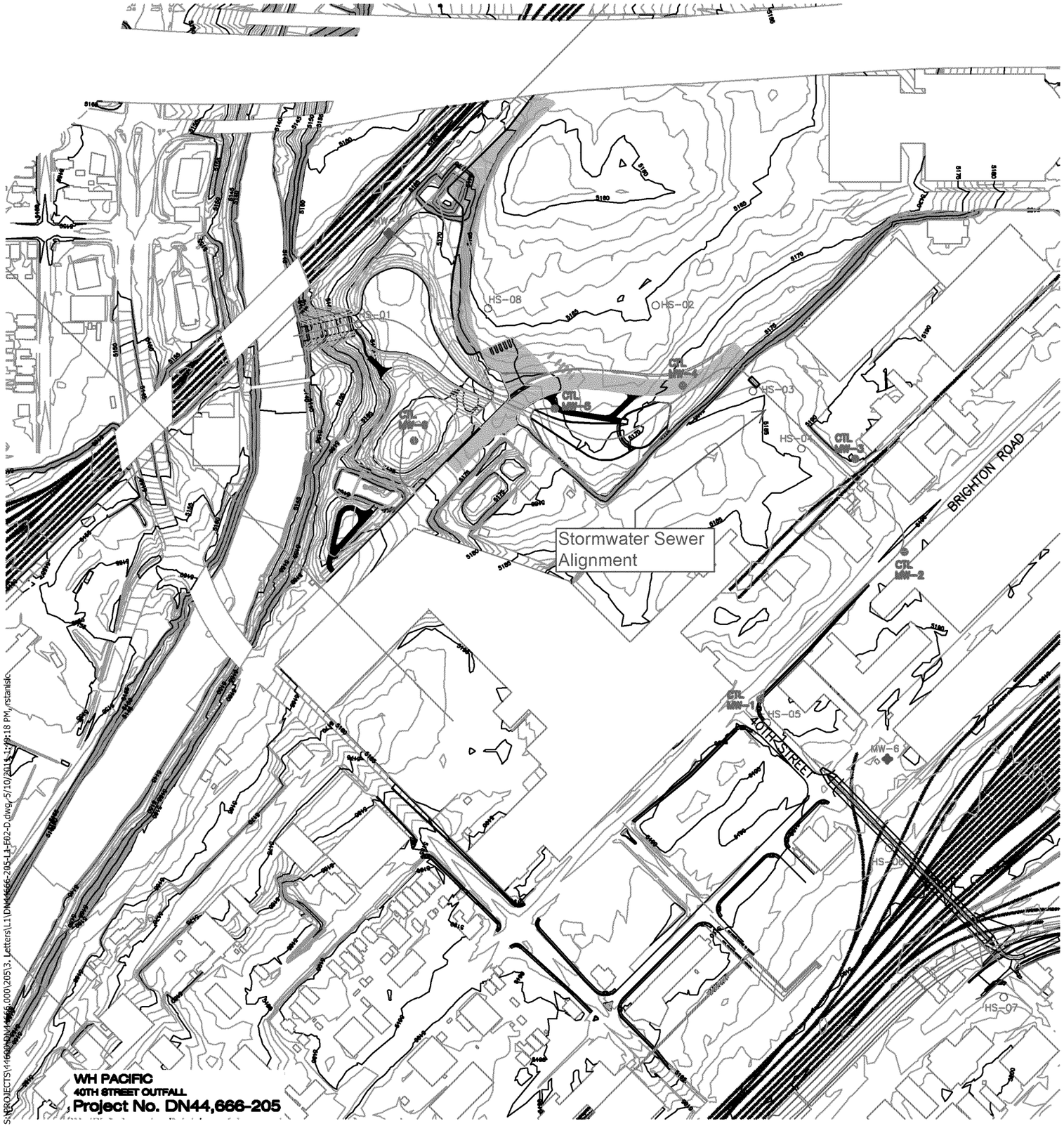
BROWN AND CALDWELL

FIGURE 2 - SOIL SAMPLE EXCEEDANCES
CITY AND COUNTY OF DENVER
HIGH STREET STORM DRAINAGE PROJECT

2016-010025-0000063




| CTL MW-1 | |
|---|---|
| ARSENIC | 1.6 |

| CTL MW-2 | |
|---|---|
| ARSENIC | 2.2 |

| CTL MW-3 | |
|---|---|
| ARSENIC | 7.9 |

| CTL MW-4 | |
|---|---|
| ARSENIC | 6.8 |
| P-DICHLOROBENZENE | 0.1769 |
| ETHYLBENZENE | 0.163 |
| TOLUENE | 0.8693 |
| XYLENE | 0.483 |

| CTL MW-5 | |
|---|---|
| ARSENIC | 3.4 |

| CTL MW-6 | |
|---|---|
| ARSENIC | 11.2 |

| HS-01 | |
|---|---|
| BENZO(A)ANTHRACENE | <0.0076 |
| BENZO(A)PYRENE | 0.0054 |
| BENZO(B)FLUROANTHENE | 0.0064 |
| DIBENZO(A,H)ANTHRACENE | <0.0076 |
| INDENO(1,2,3-CD)PYRENE | <0.0076 |
| ARSENIC | 3.5 |

| HS-02 | |
|---|---|
| BENZO(A)ANTHRACENE | 0.698 |
| BENZO(A)PYRENE | 0.625 |
| BENZO(B)FLUROANTHENE | 0.599 |
| DIBENZO(A,H)ANTHRACENE | 0.155 |
| INDENO(1,2,3-CD)PYRENE | 0.358 |
| ARSENIC | 3.7 |

| HS-03 | |
|---|---|
| BENZO(A)ANTHRACENE | <0.0069 |
| BENZO(A)PYRENE | <0.0069 |
| BENZO(B)FLUROANTHENE | <0.0069 |
| DIBENZO(A,H)ANTHRACENE | <0.0069 |
| INDENO(1,2,3-CD)PYRENE | <0.0069 |
| ARSENIC | <2.1 |

| HS-04 | |
|---|---|
| BENZO(A)ANTHRACENE | <0.0074 |
| BENZO(A)PYRENE | <0.0074 |
| BENZO(B)FLUROANTHENE | <0.0074 |
| DIBENZO(A,H)ANTHRACENE | <0.0074 |
| INDENO(1,2,3-CD)PYRENE | <0.0074 |
| ARSENIC | 2.5 |

| HS-05 | |
|---|---|
| BENZO(A)ANTHRACENE | <0.008 |
| BENZO(A)PYRENE | <0.008 |
| BENZO(B)FLUROANTHENE | <0.008 |
| DIBENZO(A,H)ANTHRACENE | <0.008 |
| INDENO(1,2,3-CD)PYRENE | <0.008 |
| ARSENIC | <2.4 |

| HS-06 | |
|---|---|
| BENZO(A)ANTHRACENE | 0.0441 |
| BENZO(A)PYRENE | 0.0423 |
| BENZO(B)FLUROANTHENE | 0.0431 |
| DIBENZO(A,H)ANTHRACENE | 0.0054 |
| INDENO(1,2,3-CD)PYRENE | 0.023 |
| ARSENIC | 4.3 |
| LEAD | 102 |
| TCLP LEAD | <0.05 |

| HS-07 | |
|---|---|
| BENZO(A)ANTHRACENE | <0.0068 |
| BENZO(A)PYRENE | <0.0068 |
| BENZO(B)FLUROANTHENE | <0.0068 |
| DIBENZO(A,H)ANTHRACENE | <0.0068 |
| INDENO(1,2,3-CD)PYRENE | <0.0068 |
| ARSENIC | <1.9 |

| HS-08 | |
|---|---|
| BENZO(A)ANTHRACENE | 1.45 |
| BENZO(A)PYRENE | 1.65 |
| BENZO(B)FLUROANTHENE | 1.55 |
| DIBENZO(A,H)ANTHRACENE | 0.267 |
| INDENO(1,2,3-CD)PYRENE | 0.936 |
| ARSENIC | 7.4 |
| LEAD | 176 |
| TCLP LEAD | 0.94 |

N

0 150 300

SCALE: 1" = 300'

LEGEND:

HS-01 ○ SOIL AND GROUNDWATER SAMPLE LOCATION INSTALLED BY BROWN AND CALDWELL 2010

MW-1 ◆ SOIL AND GROUNDWATER SAMPLE LOCATION INSTALLED AS PART OF VB/I-70 OU2 ASSESSMENTS

MW-1 ● CTL MONITORING WELL LOCATION

5170 EXISTING GROUND SURFACE ELEVATION (FEET)

NOTES: RESULTS PRESENTED IN mg/kg MILLIGRAMS/KILOGRAM

TCLP LEAD RESULTS PRESENTED IN mg/L MILLIGRAMS/LITER

# Summary of Soil Sample Results

Fig. 3

LEGEND:

HS-01 SOIL AND GROUNDWATER SAMPLE LOCATION INSTALLED BY BROWN AND CALDWELL 2010

MW-1 SOIL AND GROUNDWATER SAMPLE LOCATION INSTALLED AS PART OF VB/I-70 OU2 ASSESSMENTS

MW-1 CTL MONITORING WELL LOCATION

5170 EXISTING GROUND SURFACE ELEVATION (FEET)

NOTES:

ND-NONE DETECTED

N

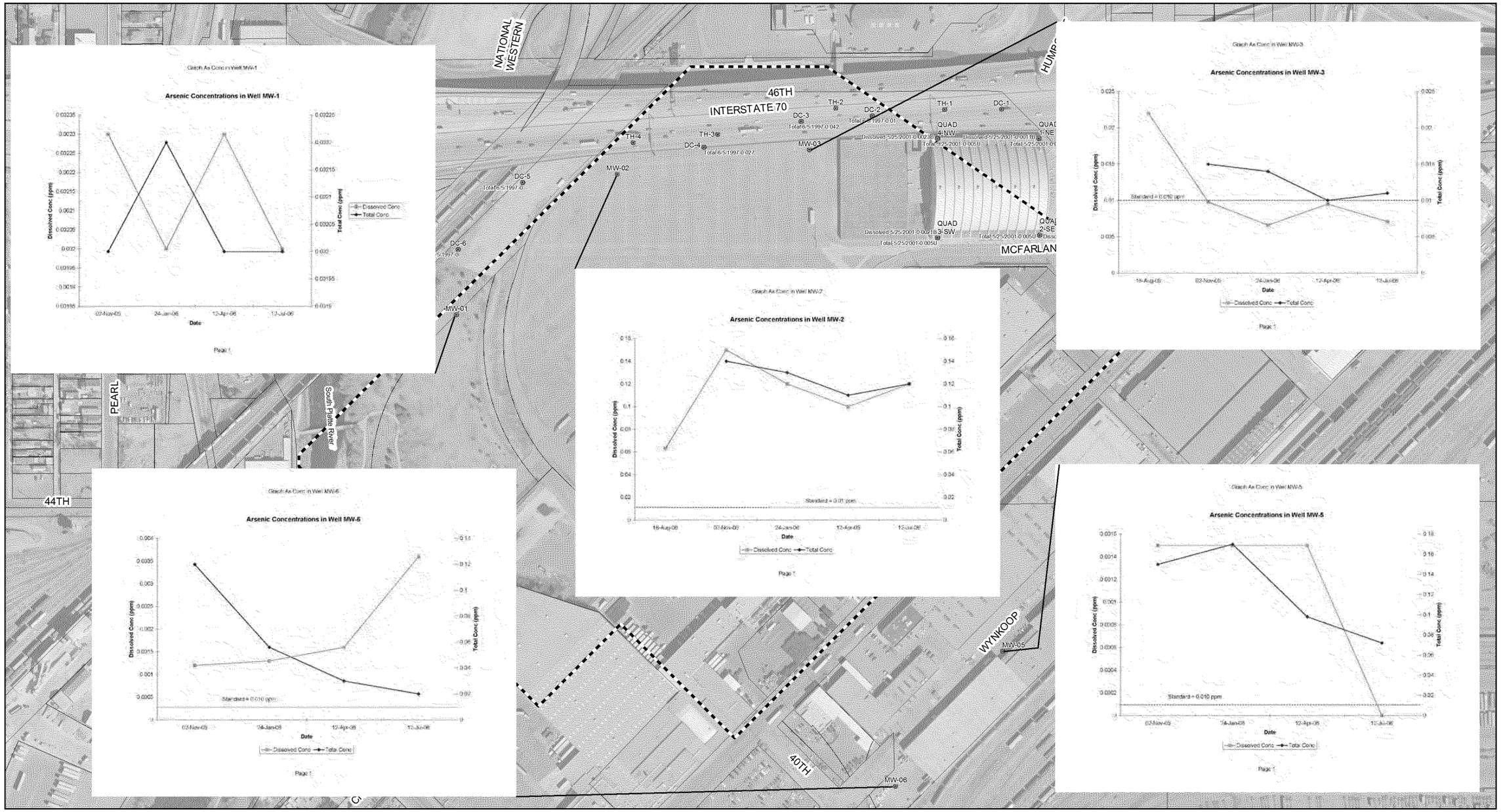
0 150 300

SCALE: 1" = 300'

**Asbestos Sample Results**

**Fig. 6**

# GROUNDWATER




**Legend**

- GW-SampleLocations

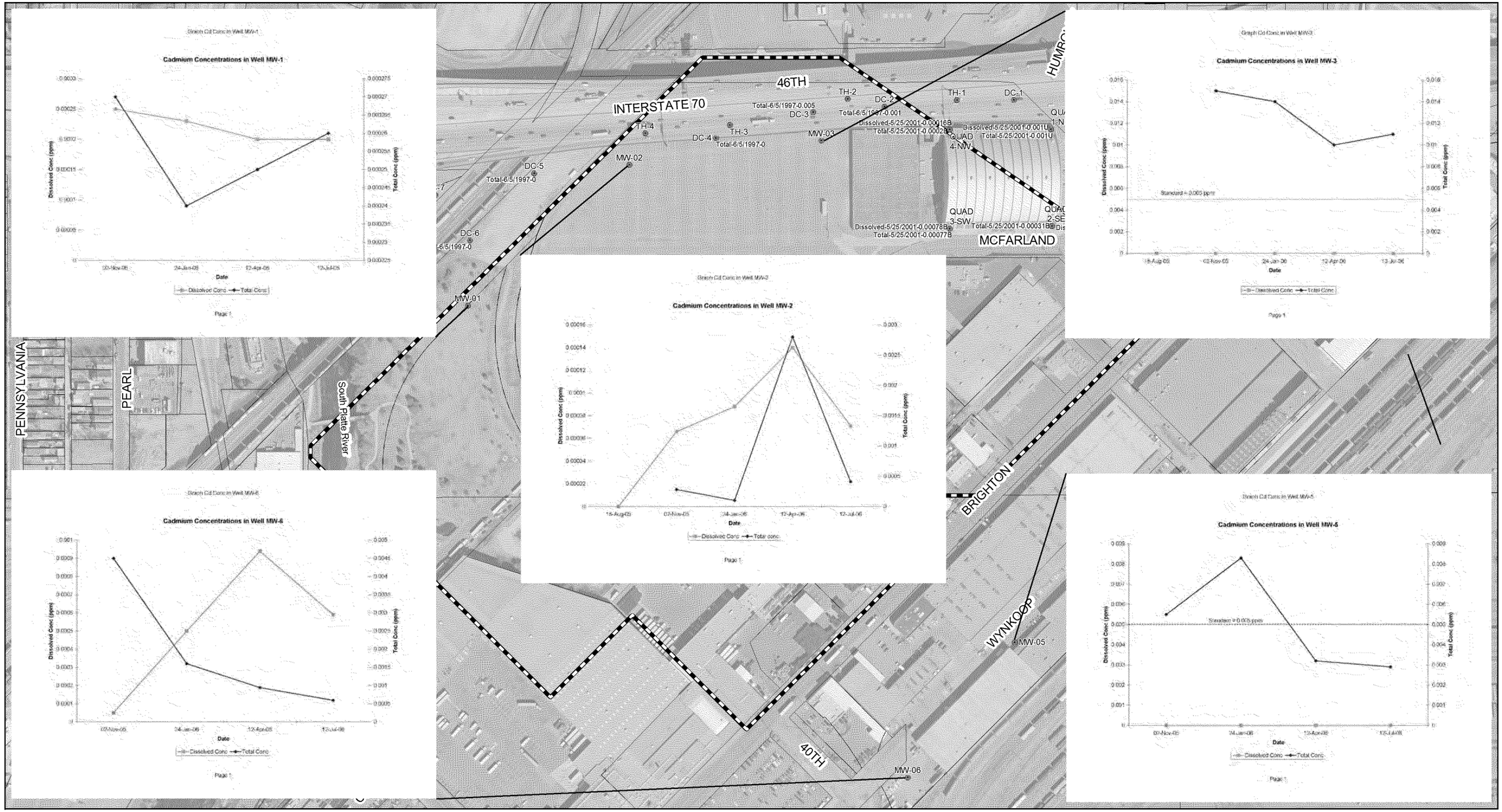
0 150 300 600
Feet

1 inch = 300 feet

N

Figure 22
Arsenic Groundwater Concentrations
VB/I-70 Remedial Investigation

EMSI Engineering Support Management, Inc.




**Legend**

- Groundwater Sample Locations

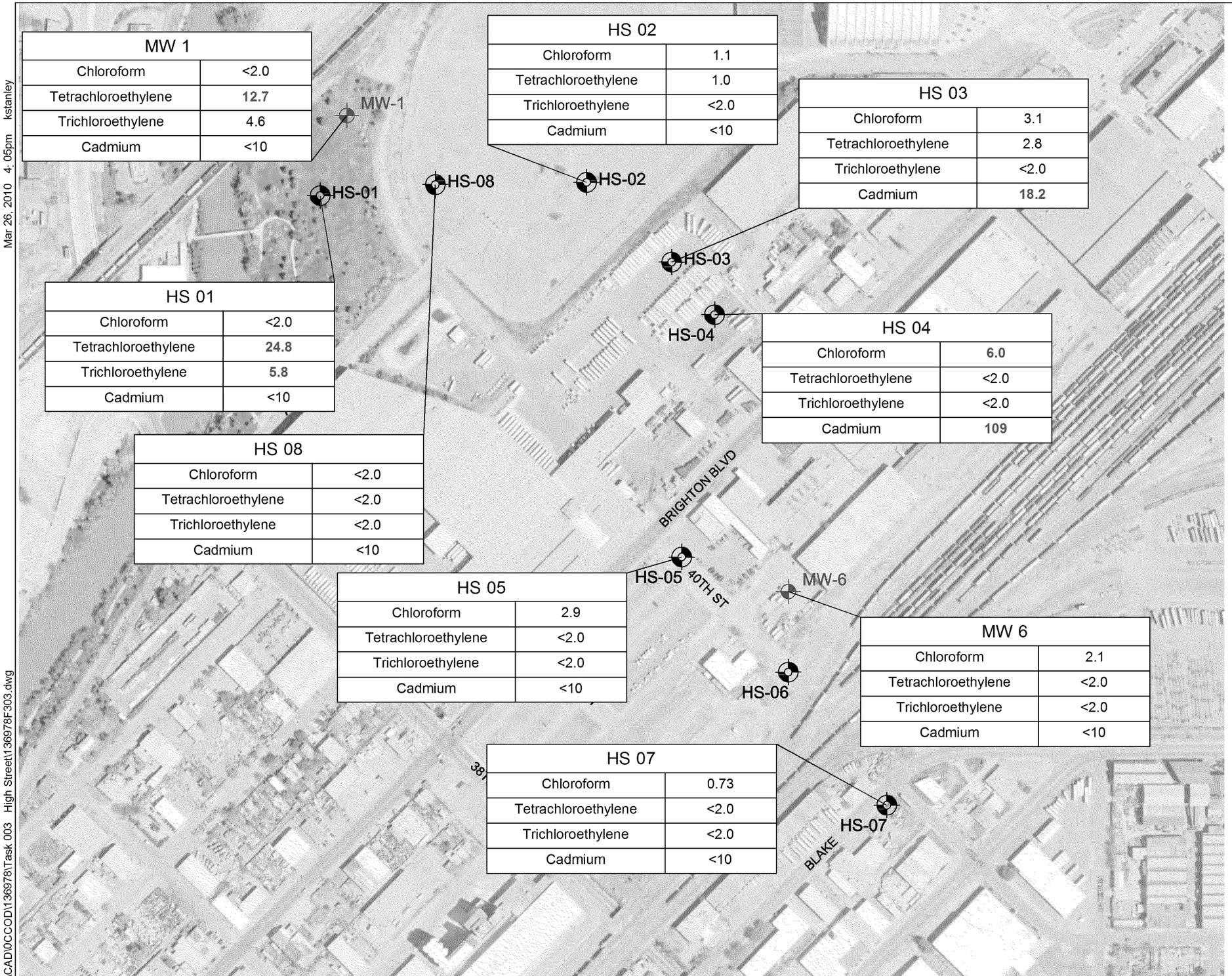
0 150 300 600
Feet

1 inch = 300 feet

N

Figure 24
Cadmium Groundwater Concentrations
VB/I-70 Remedial Investigation

EMSI Engineering Support Management, Inc.




| MW 1 | |
|---|---|
| Chloroform | <2.0 |
| Tetrachloroethylene | **12.7** |
| Trichloroethylene | 4.6 |
| Cadmium | <10 |

| HS 02 | |
|---|---|
| Chloroform | 1.1 |
| Tetrachloroethylene | 1.0 |
| Trichloroethylene | <2.0 |
| Cadmium | <10 |

| HS 03 | |
|---|---|
| Chloroform | 3.1 |
| Tetrachloroethylene | 2.8 |
| Trichloroethylene | <2.0 |
| Cadmium | **18.2** |

| HS 01 | |
|---|---|
| Chloroform | <2.0 |
| Tetrachloroethylene | **24.8** |
| Trichloroethylene | **5.8** |
| Cadmium | <10 |

| HS 04 | |
|---|---|
| Chloroform | **6.0** |
| Tetrachloroethylene | <2.0 |
| Trichloroethylene | <2.0 |
| Cadmium | **109** |

| HS 08 | |
|---|---|
| Chloroform | <2.0 |
| Tetrachloroethylene | <2.0 |
| Trichloroethylene | <2.0 |
| Cadmium | <10 |

| HS 05 | |
|---|---|
| Chloroform | 2.9 |
| Tetrachloroethylene | <2.0 |
| Trichloroethylene | <2.0 |
| Cadmium | <10 |

| MW 6 | |
|---|---|
| Chloroform | 2.1 |
| Tetrachloroethylene | <2.0 |
| Trichloroethylene | <2.0 |
| Cadmium | <10 |

| HS 07 | |
|---|---|
| Chloroform | 0.73 |
| Tetrachloroethylene | <2.0 |
| Trichloroethylene | <2.0 |
| Cadmium | <10 |

0 300' 600'
APPROXIMATE SCALE IN FEET

## LEGEND

HS 07 — SOIL AND GROUNDWATER SAMPLE LOCATION

MW 6 — EXISTING MONITORING WELL LOCATION

CDPHE — COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT, REGULATION 41, BASIC STANDARDS FOR GROUNDWATER

(:g/L) — MICROGRAMS PER LITER

| REFERENCE STANDARD TABLE | |
|---|---|
| CONSTITUENT | CDPHE EXCEEDANCE (:g/L) |
| Chloroform | **3.5** |
| Tetrachloroethylene | **5** |
| Trichloroethylene | **5** |
| Cadmium | **5** |

**BOLD BLUE** TEXT INDICATES EXCEEDANCE

AERIAL PHOTO: GOOGLE EARTH

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BROWN AND CALDWELL

FIGURE 3 GROUNDWATER SAMPLE EXCEEDANCES
CITY AND COUNTY OF DENVER
HIGH STREET STORM DRAINAGE PROJECT

| CTL MW-1 | |
|---|---|
| CHLOROFORM | 4.1 |
| PCE | 1.1 |
| XYLENE | 0.99 |
| TOTAL ARSENIC | 18.2 |

| CTL MW-2 | |
|---|---|
| CHLOROFORM | 1.1 |
| XYLENE | 0.61 |
| TOTAL ARSENIC | 22.1 |

| CTL MW-3 | |
|---|---|
| CHLOROFORM | 2.6 |
| XYLENE | 0.73 |
| TOTAL ARSENIC | 32.7 |
| DISSOLVED CADMIUM | 264 |
| DISSOLVED MANGANESE | 92.7 |

| CTL MW-4 | |
|---|---|
| PCE | 1.2 |
| CIS-1,2-DCE | 0.46 |
| XYLENE | 0.75 |
| TOTAL ARSENIC | 15.4 |
| DISSOLVED MANGANESE | 2140 |

| CTL MW-5 | |
|---|---|
| TOTAL ARSENIC | 8.5 |
| DISOLVED IRON | 23300 |
| DISSOLVED MANGANESE | 775 |
| HEXAVALENT CHROMIUM | <50 |

| CTL MW-6 | |
|---|---|
| PCE | 26.3 |
| CIS-1,2-DCE | 0.39 |
| TCE | 10.0 |
| XELENE | 0.71 |
| TOTAL ARSENIC | 57.3 |
| DISSOLVED IRON | 1000 |
| DISSOLVED MANGANESE | 3320 |
| NAPHTHALENE | 1.2 |

| HS-01 | |
|---|---|
| CHLOROFORM | <2.0 |
| TETRACHLOROETHYLENE | 24.8 |
| TRICHLOROETHYLENE | 5.8 |
| CADMIUM | <10 |

| HS-02 | |
|---|---|
| CHLOROFORM | 1.1 |
| TETRACHLOROETHYLENE | 1.0 |
| TRICHLOROETHYLENE | <2.0 |
| CADMIUM | <10 |

| HS-03 | |
|---|---|
| CHLOROFORM | 3.1 |
| TETRACHLOROETHYLENE | 2.8 |
| TRICHLOROETHYLENE | <2.0 |
| CADMIUM | 18.2 |

| HS-04 | |
|---|---|
| CHLOROFORM | 6.0 |
| TETRACHLOROETHYLENE | <2.0 |
| TRICHLOROETHYLENE | <2.0 |
| CADMIUM | 109 |

| HS-05 | |
|---|---|
| CHLOROFORM | 2.9 |
| TETRACHLOROETHYLENE | <2.0 |
| TRICHLOROETHYLENE | <2.0 |
| CADMIUM | <10 |

| HS-07 | |
|---|---|
| CHLOROFORM | 0.73 |
| TETRACHLOROETHYLENE | <2.0 |
| TRICHLOROETHYLENE | <2.0 |
| CADMIUM | <10 |

| HS-08 | |
|---|---|
| CHLOROFORM | <2.0 |
| TETRACHLOROETHYLENE | <2.0 |
| TRICHLOROETHYLENE | <2.0 |
| CADMIUM | <10 |

| MW-1 | |
|---|---|
| CHLOROFORM | <2.0 |
| TETRACHLOROETHYLENE | 12.7 |
| TRICHLOROETHYLENE | 4.6 |
| CADMIUM | <10 |

| MW-6 | |
|---|---|
| CHLOROFORM | 2.1 |
| TETRACHLOROETHYLENE | <2.0 |
| TRICHLOROETHYLENE | <2.0 |
| CADMIUM | <10 |

N

0 150 300
SCALE: 1" = 300'

LEGEND:

HS-01 SOIL AND GROUNDWATER SAMPLE LOCATION INSTALLED BY BROWN AND CALDWELL 2010

MW-1 SOIL AND GROUNDWATER SAMPLE LOCATION INSTALLED AS PART OF VB/I-70 OU2 ASSESSMENTS

MW-1 CTL MONITORING WELL LOCATION

5170 EXISTING GROUND SURFACE ELEVATION (FEET)

NOTES:

RESULTS PROVIDED IN MICROGRAMS/LITERS (ug/L)
PCE-TETRACHLOROETHENE
TCE-TRICHLOROETHENE
CIS-1,2-DCE-CIS-1,2, DICHLOROETHENE
TOTAL-METAL RESULTS PROVIDED BY 200.8 ANALYSIS
DISOLVED-METAL RESULTS PROVIDED BY 200.7 ANALYSIS
(SAMPLES LAB FILTERED PRIOR TO ANALYSIS)

# Summary of Ground Water Results

Fig. 4

S:\PROJECTS\44600\DN44666.000\205\3. Letters\L1\DN44666-205-L1-F02-D.dwg, 5/10/2011 9:45:05 AM, rstanisic

**WH PACIFIC**
**40TH STREET OUTFALL**
**Project No. DN44,666-205**

LEGEND:

HS-01 ○ SOIL AND GROUNDWATER SAMPLE LOCATION INSTALLED BY BROWN AND CALDWELL 2010

MW-1 ◆ SOIL AND GROUNDWATER SAMPLE LOCATION INSTALLED AS PART OF VB/I-70 OU2 ASSESSMENTS

**MW-1** ● CTL MONITORING WELL LOCATION

5170 EXISTING GROUND SURFACE ELEVATION (FEET)

NOTES:

(5185.96) APPROXIMATE GROUND WATER ELEVATIONS MEASURED APRIL 5, 2011

N

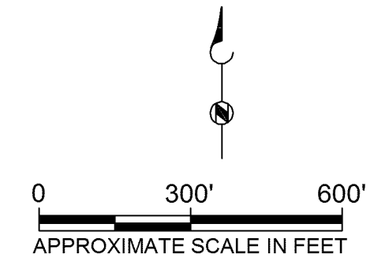
0 150 300

SCALE: 1" = 300'

# Ground Water Elevations Fig. 5

# LANDFILL GAS

AERIAL PHOTO: GOOGLE EARTH




## LEGEND

HS-07 SOIL AND GROUNDWATER SAMPLE LOCATION

MW-6 EXISTING MONITORING WELL LOCATION

$CH_4$ METHANE SOIL GAS CONCENTRATION (PERCENT OF TOTAL)

Mar 22, 2010 - 1:27pm kstanley

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BROWN AND CALDWELL

FIGURE 4 - METHANE SOIL GAS CONCENTRATION
CITY AND COUNTY OF DENVER
HIGH STREET STORM DRAINAGE PROJECT