



## TECHNICAL MEMORANDUM

RECEIVED

DEC 24 2015

WA State Department  
of Ecology (SWRO)

To: Mr. Ken Groat  
From: Jonathan Horowitz, PE  
Date: June 11, 2015  
Subject: **Second Quarter Groundwater Monitoring Results**

### INTRODUCTION

HydroCon Environmental, LLC (HydroCon) is submitting this technical memorandum to Groat Brothers, Inc. to document the work completed at 608 West Scott Avenue in Woodland, Washington (the site) in May 2015. The work was conducted according to our proposal, dated February 10, 2015 and the work plan submitted to the Washington Department of Ecology (Ecology).

### FIELD ACTIVITIES

On May 20, 2015, HydroCon personnel mobilized to the site to collect a round of groundwater levels (MW-1 through MW-7), and perform the second quarterly groundwater monitoring (MW-4 through MW-7).

Upon arrival at the site, the well cap on each well was removed and the water level was allowed to equilibrate prior to measuring the depth to water (DTW). The depth to water in each well was measured using a clean electronic water level indicator. Water levels were measured at the scribed reference mark (north end of the top of the PVC casing) at each well. A table detailing the groundwater levels and elevations and a figure indicating the groundwater flow direction are included in the attachments. Depth to water in the wells ranged from 4.98 to 8.99 feet below top of casing. Groundwater elevations were calculated based on an arbitrary measuring point. Based on the measured groundwater elevations, the groundwater flows towards the southeast at an approximate gradient of 0.0025 feet/foot.

HydroCon purged monitoring wells MW-4 through MW-7 with a low flow peristaltic pump equipped with new length of LDPE tubing attached to a new length of silicone tubing. Field parameters (pH, temperature and specific conductivity) were measured and recorded on a Groundwater Sample Collection field form along with the depth to water measurements (included in the attachment). Purging was completed when the field parameters had stabilized.

Samples were collected immediately after purging and placed in labeled laboratory-prepared sample bottles. The samples were shipped in an iced cooler along with chain-of-custody documentation to the project laboratory for analysis.



A total of four groundwater samples were collected for laboratory analysis. Each sample was analyzed for the following set of parameters:

- Diesel Range Organics (DRO) and Motor Oil Range Organics (ORO) by Northwest Method NWTPH-Dx.

## SAMPLING RESULTS

DRO and/or ORO were detected at concentrations above the laboratory Method Reporting Limits (MRLs) in all of the samples submitted; however, the detected concentrations were below the applicable MTCA Method A Cleanup Levels. A summary data table and the laboratory report are included in the attachments.

## DISCUSSION

Based on the analytical results, HydroCon recommends the following:

- The next round of monitoring should be conducted during the third quarter of 2015.
- Provided that the results from subsequent sampling events remain below the MTCA Method A Cleanup Levels, monitoring well MW-5 should be sampled a fifth time to provide Ecology with four consecutive quarters of compliance monitoring.

## QUALIFICATIONS

HydroCon's services were performed in a manner consistent with generally accepted practices of the profession undertaken in similar studies in the same geographical area during the same time period. HydroCon makes no warranties, either express or implied, regarding the findings, conclusions or recommendations. Please note that HydroCon does not warrant the work of laboratories, regulatory agencies, or other third parties supplying information used in the preparation of the report.

Findings and conclusions resulting from these services are based upon information derived from the on-site activities and other services performed under this scope of work; such information is subject to change over time. Certain indicators of the presence of hazardous substances, petroleum products, or other constituents may have been latent, inaccessible, unobservable, nondetectable or not present during these services, and we cannot represent that the site contains no hazardous substances, toxic materials, petroleum products, or other latent conditions beyond those identified during this monitoring. Subsurface conditions may vary from those encountered at specific sampling locations or during other surveys, tests, assessments, investigations, or exploratory services; the data, interpretations and findings are based solely upon data obtained at the time and within the scope of these services.

This report is intended for the sole use of **Groat Brothers, Inc.** This report may not be used or relied upon by any other party without the written consent of HydroCon. The scope of services performed in execution of this evaluation may not be appropriate to satisfy the needs of other users, and use or re-use of this document or the findings, conclusions, or recommendations is at the risk of said user.

The conclusions presented in this report are, in part, based upon subsurface sampling performed at selected locations and depths. There may be conditions between borings or samples that differ significantly from those presented in this report and which cannot be predicted by this study.

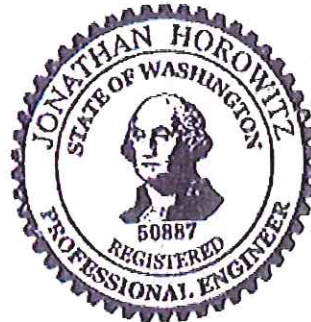
## CLOSING

We appreciate the opportunity to perform these services for Groat Brothers, Inc. Please contact the undersigned at (360) 703-6079 if you have any questions regarding the information provided in this letter report.

Sincerely,

The logo for HydroCon, featuring the word "Hydro" in blue and "Con" in green, with a stylized water drop icon in blue and green between the two words.A handwritten signature in blue ink, appearing to read "J. Horowitz".

Jonathan Horowitz, PE  
Project Engineer



### Figures

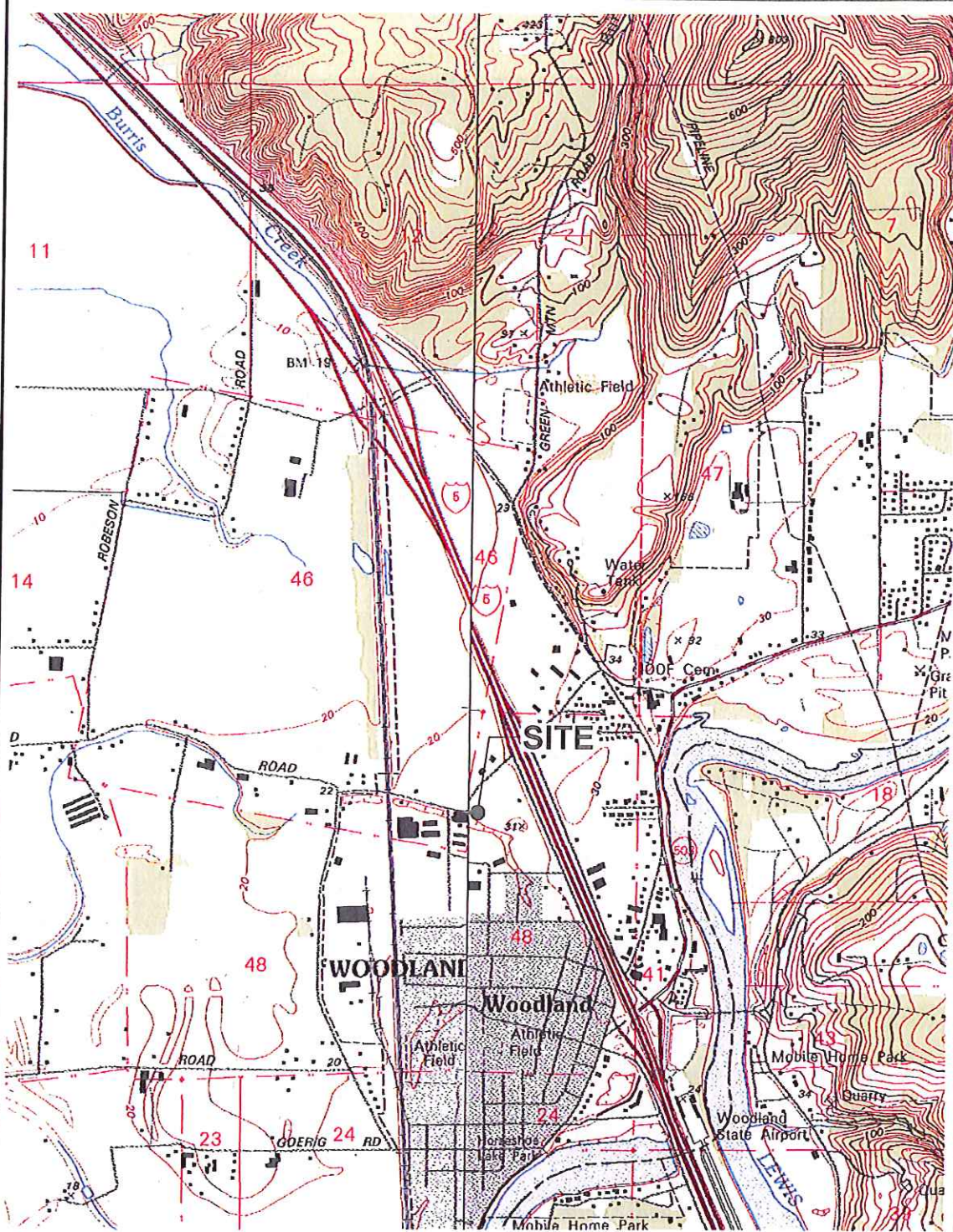
- Figure 1 – Site Location Map
- Figure 2 – Site Features Map
- Figure 3 – Groundwater Analytical Results
- Figure 4 – Groundwater Elevations and Contour Map

### Tables

- Table 1 – Summary of Groundwater Elevations
- Table 2 – Summary of 2<sup>nd</sup> Quarter Groundwater Analytical Results
- Table 3 – Summary of Historical Groundwater Analytical Results

### Attachments

- Attachment A - Groundwater Sample Collection Field Forms
- Attachment B - Laboratory Report and Chain-of-Custody Documentation

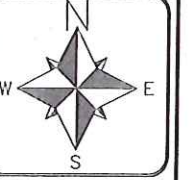
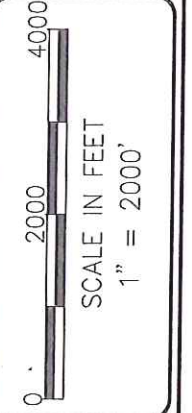


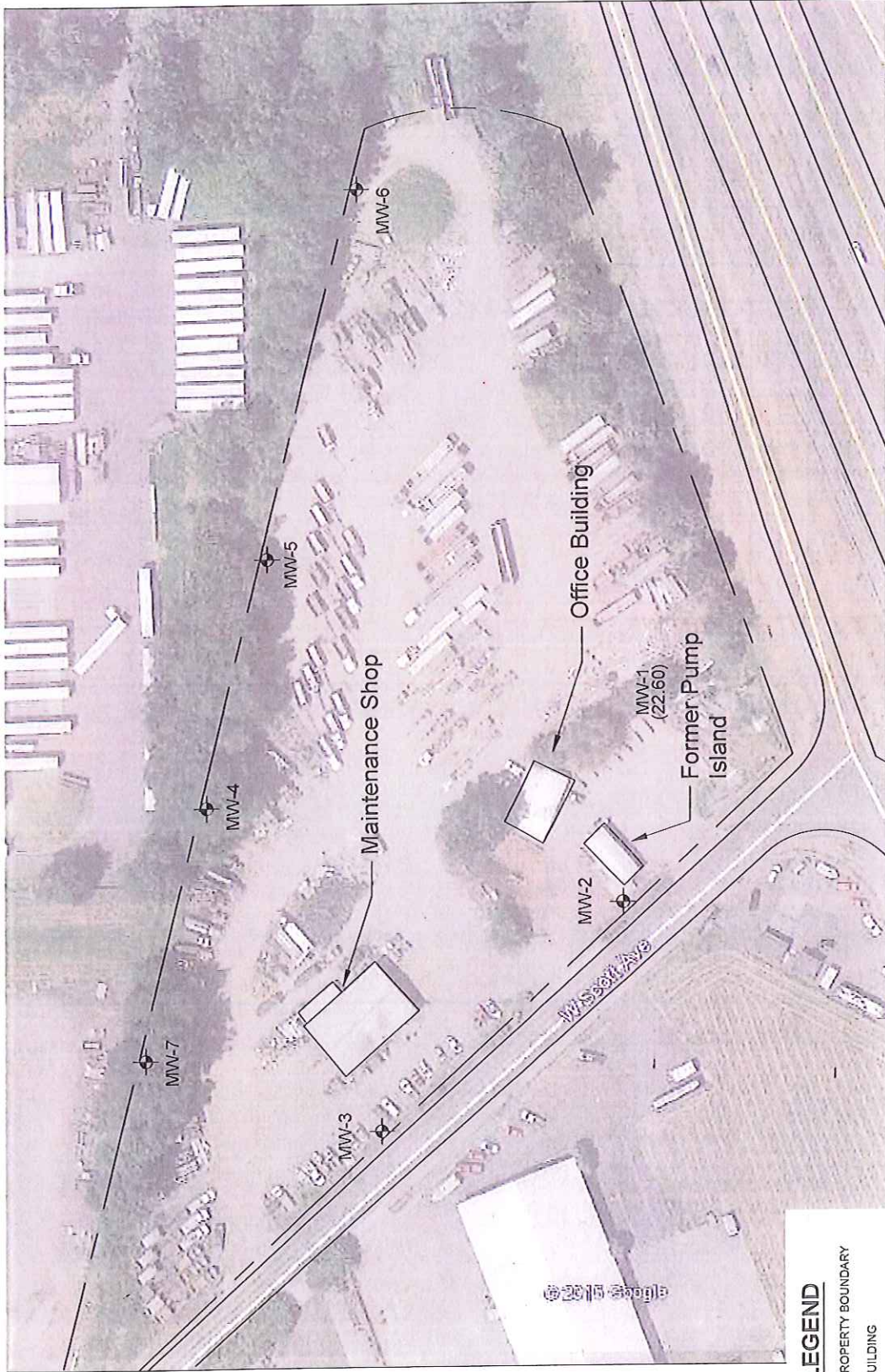
**NOTE(S):**  
 USGS, DEER ISLAND/WOODLAND QUADRANGLE  
 WASHINGTON  
 7.5 MINUTE SERIES (TOPOGRAPHIC)

**FIGURE 1**  
 SITE LOCATION MAP  
 GROT BROTHERS, INC.  
 608 WEST SCOTT AVENUE  
 WOODLAND, WA

DATE: 04-08-15  
 DWN: MG  
 CHK: JH  
 APPROVED:  
 PRJ. MGR: DB  
 PROJECT NO:  
 2015-006

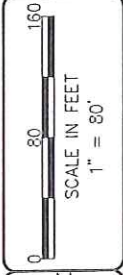
510 Allen St. Suite B Kelso, Wa 98626, PH(360)703-6086





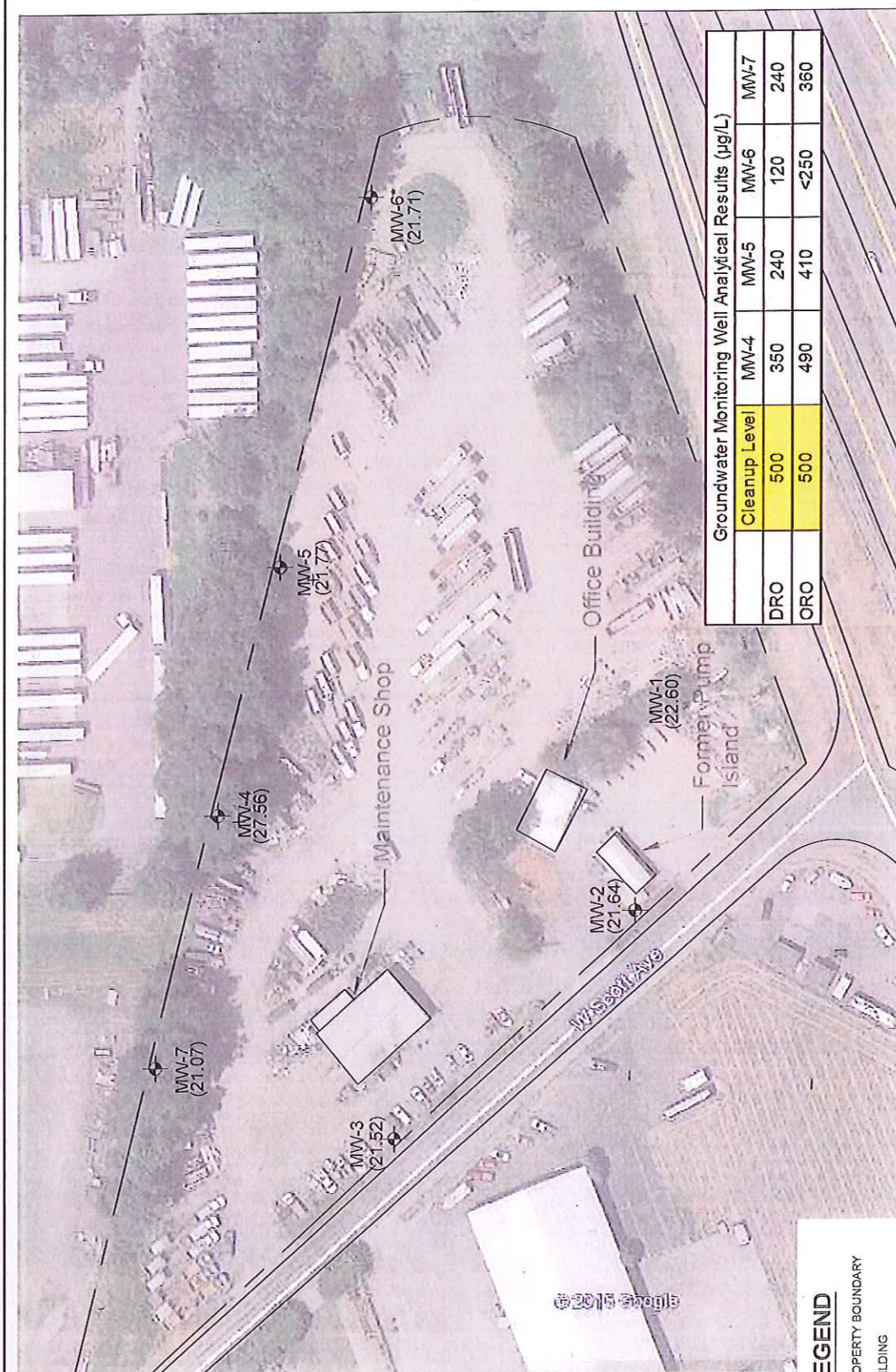
**LEGEND**

- PROPERTY BOUNDARY
- BUILDING
- MW-01 MONITORING WELL



DATE: 06-09-15  
 DWN: MG  
 CHK: JH  
 APPROVED:  
 PRJ. MGR: CH  
 PROJ. MGR: JG  
 2015-006

FIGURE 2  
 SITE FEATURES  
 GRAY BROTHERS, INC.  
 608 INDUSTRIAL WAY  
 WOODLAND, WA

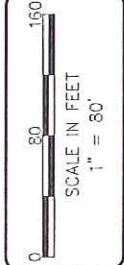
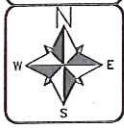


Groundwater Monitoring Well Analytical Results (µg/L)						
	Cleanup Level	MW-4	MW-5	MW-6	MW-7	
DRO	500	350	240	120	240	
ORO	500	490	410	<250	360	

**LEGEND**

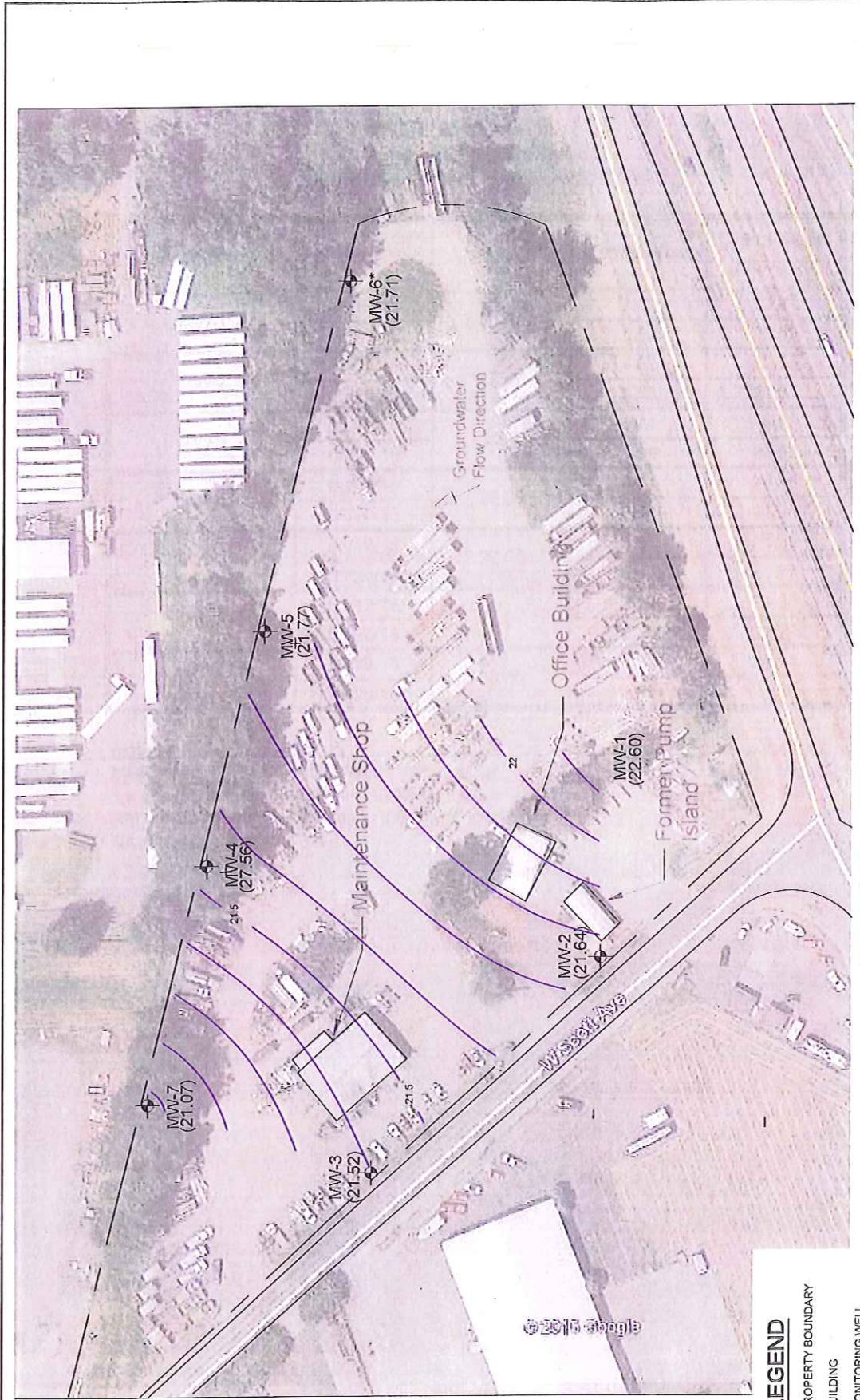
- PROPERTY BOUNDARY
- BUILDING
- ◆ MONITORING WELL (GROUNDWATER ELEV. NAVD88)
- MW-01 (XX.XX)

\*Note: Groundwater elevation of MW-6 was not utilized for the flow direction calculation



DATE: 06-08-15  
 DWN: MG  
 CHK: JH  
 APPROVED:  
 PRJ. MGR: CH  
 PROJECT NO:  
 2015-006

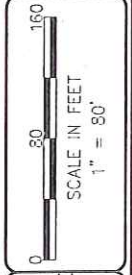
FIGURE 3  
 GROUNDWATER ANALYTICAL RESULTS  
 GROYT BROTHERS, INC.  
 608 INDUSTRIAL WAY  
 WOODLAND, WA



**LEGEND**

- PROPERTY BOUNDARY
- BUILDING
- MW-01 (XX.XX) MONITORING WELL (GROUNDWATER ELEV. NAVD88)

\*Note: Groundwater elevation of MW-6 was not utilized for the flow direction calculation



DATE: 06-08-15  
 DWN: MG  
 CHK: JH  
 APPROVED:  
 PRJ. MGR: CH  
 PROJECT NO: 2015-006

FIGURE 4  
 GROUNDWATER ELEVATIONS & COUNTOUR MAP  
 GREAT BROTHERS, INC.  
 600 INDUSTRIAL WAY  
 WOODLAND, WA

**Table 1**  
**Summary of Groundwater Elevations**  
**Groat Brothers, Inc.**  
**Woodland, Washington**  
**HydroCon Project Number 2015-006**

Monitoring Well ID	Date	MPE*	Depth to Water	Groundwater Elevation
MW-1	03/19/15	30.47	7.06	23.41
	05/20/15		7.87	22.60
MW-2	03/19/15	28.07	4.82	23.25
	05/20/15		6.43	21.64
MW-3	03/19/15	26.5	NM	NA
	05/20/15		4.98	21.52
MW-4	03/19/15	28.96	4.81	24.15
	05/20/15		7.40	21.56
MW-5	03/19/15	27.90	3.55	24.35
	05/20/15		6.13	21.77
MW-6	03/19/15	27.97	3.66	24.31
	05/20/15		6.26	21.71
MW-7	03/19/15	30.06	5.85	24.21
	05/20/15		8.99	21.07

**Notes:**

MPE = Measuring Point Elevation

\* = Elevation measured relative to MPE

NM = Well not measured due to inability to locate it

NA = Not applicable



**Table 2**  
**Summary of 2nd Quarter Groundwater Analytical Results**  
**Groat Brothers, Inc.**  
**Woodland, Washington**  
**HydroCon Project Number 2015-006**

Sample ID	MW-4	MW-5	MW-6	MW-7
Lab Sample ID	505357-01	505357-02	505357-03	505357-04
Collection Date	3/26/15	3/26/15	3/26/15	3/26/15
Parameter	Value	Value	Value	Value
	Q	Q	Q	Q
Total Petroleum Hydrocarbons (TPH)				
TPH Diesel Range (DRO)	350	240	120	240
	x	x	x	x
TPH Motor Oil Range (ORO)	490	410	<250	360
	x	x		x

**Notes and Qualifiers: (Q; only shown in Table if reported by laboratory)**

< = Compound not detected above the laboratory Method Reporting Limits (MRLs).

µg/L = micrograms per liter (parts per billion)

x = The sample chromatographic pattern does not resemble the fuel standard used for quantitation.

Color highlighted cells indicate reported concentration exceeds corresponding MTCA Level A Cleanup Value.

**Table 3**  
**Summary of Historical Groundwater Analytical Results**  
**Groat Brothers Inc.**  
**Woodland, Washington**  
**HydroCon Project Number 2015-006**

Monitoring Well ID	Sample Date	Diesel	Motor Oil
MW-4	10/16/2014	130	<325
	3/26/2015	350	490
MW-5	4/16/2015	70	550
	3/26/2015	240	410
MW-6	1/14/2015	<50	<250
	3/26/2015	120	<250
MW-7	10/16/2014	260	330
	3/26/2015	240	360
<b>Ecology MTCA Method A Cleanup Level</b>		<b>500</b>	<b>500</b>

**Notes:**

TPH as Diesel and Oil by NWTPH-Dx.

< = Compound not detected above the laboratory Method Reporting Limits (MRLs).

µg/L = micrograms per liter (parts per billion)

Color highlighted cells indicate reported concentration exceeds corresponding MTCA Level A Cleanup Value.

ATTACHMENT A  
GROUNDWATER SAMPLE COLLECTION FIELD FORMS

# GROUNDWATER PURGE AND SAMPLE COLLECTION

Well I.D. Number: MW-4

Project Name (Number): Grant Bios.  
 Hydrocon Project Number: 2015-006  
 Date: 5/20/15

Sample I.D.: MW-4 Time: 11:15  
 Field Duplicate I.D.: \_\_\_\_\_ Time: \_\_\_\_\_  
 Personnel: JPH

### WELL INFORMATION

Monument condition:  Good  Needs repair: \_\_\_\_\_  Water in Monument  
 Well cap condition:  Good  Replaced  Needs Replacement  Surface Water Well Infiltration  
 Headspace reading:  Not measured PID Reading \_\_\_\_\_ ppm  Odor: \_\_\_\_\_  
 Well diameter:  2-inch  4-inch  6-inch  Other: \_\_\_\_\_  
 Comments: \_\_\_\_\_

### PURGING INFORMATION

Total well depth: 19.00 ft Bottom:  Hard  Soft  Not measured Screen Interval(s): \_\_\_\_\_  
 Depth to product: \_\_\_\_\_ ft  
 Depth to water: 7.40 ft Intake Depth (BTOC): \_\_\_\_\_ Begin Purging Well: 11:05  
 Casing volume: 7.60 ft (H<sub>2</sub>O) X 0.16 gal/ft = 1.22 gal. X 3 = 3.65 gal.  
 Volume Conversion Factors: 3/4"=0.02 gal/ft 1"=0.04 gal/ft 2"=0.16 gal/ft 4"=0.65 gal/ft 6"=1.47 gal/ft

### PURGING/DISPOSAL METHOD

Pump type  Peristaltic  Centrifugal  Dedicated Bladder  Non-Dedicated Bladder Other: \_\_\_\_\_  
 Bailer type: \_\_\_\_\_ Water Disposal:  Drummed  Remediation System  Other \_\_\_\_\_

Odor and/or Sheen: \_\_\_\_\_

### FIELD PARAMETERS

Time	Water Level (BTOC)	Purge Rate (L/min)	Temp. (°C)	Sp. Cond. (mS/cm) (±3%)	Dissolved Oxygen (±10% or ≤1.00 ±0.2)	pH (SU) (±0.1)	ORP (mV)	Turbidity (NTU) (±10% or ≤10)
11:05	7.40		12.3	0.174		5.77	20	
11:10	7.36		11.9	0.175		5.78	10	
11:15	7.33		11.6	0.176		5.78	4	

Stabilization achieved if three successive measurements for pH, Conductivity and Turbidity and/or Dissolved Oxygen are recorded within their respective stabilization criteria. A minimum of six measurements should be recorded.  
 Purging Comments: \_\_\_\_\_

### SAMPLE INFORMATION

Container Type	Bottle Count	Preservative	Field Filtered?	Analysis
<u>500ml amber</u>	<u>1</u>	<u>None</u>	<u>No</u> 0.45 0.10	<u>TPH-Dx</u>
			No 0.45 0.10	
			No 0.45 0.10	
			No 0.45 0.10	
			No 0.45 0.10	

Sampling Comments: \_\_\_\_\_

# GROUNDWATER PURGE AND SAMPLE COLLECTION

Well I.D. Number: MW-5

Project Name (Number): Great Brog.  
 Hydrocon Project Number: 2015-006  
 Date: 5/20/15

Sample I.D.: MW-5 Time: 11:35  
 Field Duplicate I.D.: - Time: -  
 Personnel: JPH

## WELL INFORMATION

Monument condition:  Good  Needs repair:  Water in Monument  
 Well cap condition:  Good  Replaced  Needs Replacement  Surface Water Well Infiltration  
 Headspace reading:  Not measured PID Reading \_\_\_\_\_ ppm  Odor: \_\_\_\_\_  
 Well diameter:  2-inch  4-inch  6-inch  Other: \_\_\_\_\_  
 Comments: \_\_\_\_\_

## PURGING INFORMATION

Total well depth: 15.00 ft Bottom:  Hard  Soft  Not measured Screen Interval(s): \_\_\_\_\_  
 Depth to product: \_\_\_\_\_ ft  
 Depth to water: 6.15 ft Intake Depth (BTOC): \_\_\_\_\_ Begin Purging Well: \_\_\_\_\_  
 Casing volume: 8.85 ft (H<sub>2</sub>O) X 0.16 gal/ft = 142 gal. X 3 = 425 gal.  
 Volume Conversion Factors: 3/4"=0.02 gal/ft 1"=0.04 gal/ft 2"=0.16 gal/ft 4"=0.65 gal/ft 6"= 1.47 gal/ft

## PURGING/DISPOSAL METHOD

Pump type  Peristaltic  Centrifugal  Dedicated Bladder  Non-Dedicated Bladder Other \_\_\_\_\_  
 Bailer type: \_\_\_\_\_ Water Disposal:  Drummed  Remediation System  Other \_\_\_\_\_

## FIELD PARAMETERS

Odor and/or Sheen: \_\_\_\_\_

Time	Water Level (BTOC)	Purge Rate (L/min)	Temp. (°C)	Sp. Cond. (mS/cm) (±3%)	Dissolved Oxygen (±10% or ≤1.00 ±0.2)	pH (SU) (±0.1)	ORP (mV)	Turbidity (NTU) (± 10% or ≤10)
11:25	6.15		12.3	0.146		5.81	-11	
11:30	6.17		12.1	0.148		5.81	-14	
11:35	6.18		11.9	0.150		5.79	-17	

Stabilization achieved if three successive measurements for pH, Conductivity and Turbidity and/or Dissolved Oxygen are recorded within their respective stabilization criteria. A minimum of six measurements should be recorded.  
 Purging Comments: \_\_\_\_\_

## SAMPLE INFORMATION

Container Type	Bottle Count	Preservative	Field Filtered?		Analysis
			No	Yes	
600ml amber	1	None	No	0.45 0.10	TPH Dx
			<input checked="" type="checkbox"/>	0.45 0.10	
			No	0.45 0.10	
			No	0.45 0.10	

Sampling Comments: \_\_\_\_\_

# GROUNDWATER PURGE AND SAMPLE COLLECTION

Well I.D. Number: MW-6

Project Name (Number): Goat Bros.  
 Hydrocon Project Number: 2015-006  
 Date: 5/29/15

Sample I.D.: MW-6 Time: 12:00  
 Field Duplicate I.D.: - Time: -  
 Personnel: JPH

### WELL INFORMATION

Monument condition:  Good  Needs repair: \_\_\_\_\_  Water in Monument  
 Well cap condition:  Good  Replaced  Needs Replacement  Surface Water Well Infiltration  
 Headspace reading:  Not measured PID Reading \_\_\_\_\_ ppm  Odor: \_\_\_\_\_  
 Well diameter:  2-inch  4-inch  6-inch  Other: \_\_\_\_\_  
 Comments: \_\_\_\_\_

### PURGING INFORMATION

Total well depth: 19.00 ft Bottom:  Hard  Soft  Not measured Screen Interval(s): \_\_\_\_\_  
 Depth to product: \_\_\_\_\_ ft  
 Depth to water: 6.26 ft Intake Depth (BTOC): \_\_\_\_\_ Begin Purging Well: \_\_\_\_\_  
 Casing volume: 8.74 ft (H<sub>2</sub>O) X 0.16 gal/ft = 1.40 gal. X 3 = 4.20 gal.  
 Volume Conversion Factors: 3/4"=0.02 gal/ft 1"=0.04 gal/ft 2"=0.16 gal/ft 4"=0.65 gal/ft 6"= 1.47 gal/ft

### PURGING/DISPOSAL METHOD

Pump type  Peristaltic  Centrifugal  Dedicated Bladder  Non-Dedicated Bladder Other \_\_\_\_\_  
 Bailer type: \_\_\_\_\_ Water Disposal:  Drummed  Remediation System  Other \_\_\_\_\_

### FIELD PARAMETERS

Odor and/or Sheen: \_\_\_\_\_

Time	Water Level (BTOC)	Purge Rate (L/min)	Temp. (°C)	Sp. Cond. (mS/cm) (±3%)	Dissolved Oxygen (±10% or ≤1.00 ±0.2)	pH (SU) (±0.1)	ORP (mV)	Turbidity (NTU) (± 10% or ≤10)
11:50	6.26		14.7	0.105		5.71	7	
11:55	6.21		14.3	0.106		5.64	3	
12:00	6.24		13.9	0.105		5.63	1	

Stabilization achieved if three successive measurements for pH, Conductivity and Turbidity and/or Dissolved Oxygen are recorded within their respective stabilization criteria. A minimum of six measurements should be recorded.  
 Purging Comments: \_\_\_\_\_

### SAMPLE INFORMATION

Container Type	Bottle Count	Preservative	Field Filtered?	Analysis
<u>500ml amber</u>	<u>1</u>	<u>None</u>	<u>No</u> 0.45 0.10	<u>TPH-Dx</u>
			No 0.45 0.10	
			No 0.45 0.10	
			No 0.45 0.10	
			No 0.45 0.10	

Sampling Comments: \_\_\_\_\_

# GROUNDWATER PURGE AND SAMPLE COLLECTION



Well I.D. Number: MW-7

Project Name (Number): Great Bros.  
 Hydrocon Project Number: 2015-006  
 Date: 5/20/15

Sample I.D.: MW-7 Time: 11:00  
 Field Duplicate I.D.: - Time: -  
 Personnel: JPH

### WELL INFORMATION

Monument condition:  Good  Needs repair: \_\_\_\_\_  Water in Monument  
 Well cap condition:  Good  Replaced  Needs Replacement  Surface Water Well Infiltration  
 Headspace reading:  Not measured PID Reading \_\_\_\_\_ ppm  Odor: \_\_\_\_\_  
 Well diameter:  2-inch  4-inch  6-inch  Other: \_\_\_\_\_  
 Comments: \_\_\_\_\_

### PURGING INFORMATION

Total well depth: 1500 ft Bottom:  Hard  Soft  Not measured Screen Interval(s): \_\_\_\_\_  
 Depth to product: \_\_\_\_\_ ft  
 Depth to water: 899 ft Intake Depth (BTOC): \_\_\_\_\_ Begin Purging Well: 10:50  
 Casing volume: 6.01 ft (H<sub>2</sub>O) X 0.16 gal/ft = 0.96 gal. X 3 = 2.88 gal.  
 Volume Conversion Factors: 3/4"=0.02 gal/ft 1"=0.04 gal/ft 2"=0.16 gal/ft 4"=0.65 gal/ft 6"= 1.47 gal/ft

### PURGING/DISPOSAL METHOD

Pump type  Peristaltic  Centrifugal  Dedicated Bladder  Non-Dedicated Bladder Other: \_\_\_\_\_  
 Bailer type: \_\_\_\_\_ Water Disposal:  Drummed  Remediation System  Other: \_\_\_\_\_

### FIELD PARAMETERS

Odor and/or Sheen: \_\_\_\_\_

Time	Water Level (BTOC)	Purge Rate (L/min)	Temp. (°C)	Sp. Cond. (mS/cm) (±3%)	Dissolved Oxygen (±10% or ≤1.00 ±0.2)	pH (SU) (±0.1)	ORP (mV)	Turbidity (NTU) (± 10% or ≤10)
10:50	899		12.7	0.111		5.40	76	
10:55	898		12.3	0.112		5.30	68	
11:00	893		11.9	0.112		5.29	58	

Stabilization achieved if three successive measurements for pH, Conductivity and Turbidity and/or Dissolved Oxygen are recorded within their respective stabilization criteria. A minimum of six measurements should be recorded.  
 Purging Comments: \_\_\_\_\_

### SAMPLE INFORMATION

Container Type	Bottle Count	Preservative	Field Filtered?	Analysis
500ml amber	1	None	<input checked="" type="checkbox"/> 0.45 0.10	TPH-Dx
			<input type="checkbox"/> 0.45 0.10	
			<input type="checkbox"/> 0.45 0.10	
			<input type="checkbox"/> 0.45 0.10	
			<input type="checkbox"/> 0.45 0.10	

Sampling Comments: \_\_\_\_\_