



**EIGHTEEN-MONTH EVENT 2012  
GROUNDWATER MONITORING REPORT  
MEARS GRAMOR  
CENTER SQUARE - SOUTH  
NE 20<sup>th</sup> AVENUE & NE HIGHWAY 99  
ASTRO #607 - TRAIL MART  
ECOLOGY VCP #SW0821  
VANCOUVER, WASHINGTON**

**Kleinfelder Project No. 102657  
December 13, 2012**

**RECEIVED**  
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WA State Department  
of Ecology (SWRO)

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December 13, 2012  
Kleinfelder Project No.: 102657

Mr. Ryan Cain  
Mears Gramor, LLC  
19767 SW 72<sup>nd</sup> Avenue, #100  
Tualatin, Oregon 97062

**Subject: Eighteen-Month Event 2012  
Groundwater Monitoring Report  
Mears Gramor - Center Square - South  
NE 20<sup>th</sup> Avenue & NE Highway 99  
Astro #607 - Trail Mart  
Ecology VCP #SW0821  
Vancouver, Washington**

Dear Mr. Cain:

Kleinfelder is pleased to submit this report that summarizes the field activities and findings of the eighteen-month 2012 groundwater monitoring event conducted at the above-referenced site in Vancouver, Washington. The monitoring schedule is on an 18-month frequency in accordance with the site's No Further Action determination. We are also forwarding a copy of this report to Panjini Balaraju from the Washington Department of Ecology. Panjini said he would check with his manager to see if a Periodic Review could be done even though we have not had 5 years pass since the NFA was issued. The intent of the Periodic Review is to see if monitoring can be stopped.

Kleinfelder appreciates the opportunity to be of service on this project. Should you require additional information or have any questions regarding this report, please contact this office at your convenience.

Sincerely,  
**KLEINFELDER WEST, INC.**

A handwritten signature in purple ink that reads "Peter L. Stroud".

Peter L. Stroud, L.E.G.  
Principal Engineering Geologist

cc: Mr. Scott Rose and Mr. Panjini Balaraju, Washington Department of Ecology

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- A Site Assessment Methods
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## 1 INTRODUCTION

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This report summarizes the field activities and findings of the eighteen-month 2012 groundwater monitoring event conducted on October 31, 2012, at the Mears Gramor, LLC, Center Square – South property. The site consists of the southern half of two conjoined sites located between NE 20th Avenue and NE Highway 99 in Vancouver, Washington (Figure 1). Previous reports combined the two sites due to single ownership and subsequent development as a single property with multiple retail outlets. However, due to the nature of the two separate, and chemically different potential contaminant plumes, this report will only focus on what is now called Center Square - South. A groundwater monitoring program was reinstated at the site in April 2005 following installation of three groundwater monitoring wells (Kleinfelder, 2005). Groundwater monitoring was conducted to evaluate seasonal groundwater fluctuations and residual impacts to groundwater from previous petroleum hydrocarbons detected at the site in 2005. A No Further Action (NFA) determination dated December 17, 2009 was issued by the Washington Department of Ecology (Ecology). However, as part of the NFA an environmental covenant was recorded which requires groundwater monitoring to be conducted at 18-month intervals starting with the August 2009 groundwater monitoring event. The groundwater monitoring protocol is described in a Sampling and Analysis Plan prepared by Kleinfelder, dated August 4, 2009, that is an enclosure to the environmental covenant.

Ecology's policy includes a Periodic Review on 5-year intervals to assess site conditions and evaluate if the monitoring scope can be changed or possibly terminated. We are submitting an extra copy of this report to Ecology in order to see if a Periodic Review can be conducted at this time.

## 2 SITE DESCRIPTION

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The site consists of the southern half of a triangular parcel of land bounded on the north by NE 134<sup>th</sup> Street, on the east by NE 20<sup>th</sup> Avenue, and on the west by NE Highway 99 (Figure 1). The property is situated in the southeast quarter of the northwest quarter of Section 26, Township 3 North, Range 1 East, Willamette Meridian, Clark County, Washington (U.S. Geological Survey, 1970).

Center Square – South consists of various new retail outlets constructed where the former Trail Mart convenience store / Astro #607 (Astro) was located in the southern portion of the property (previously referred to as Lot 24). Underground storage tanks (USTs) and associated piping and dispensers were completely removed in 2004. A site assessment was conducted in 2005 (Kleinfelder 2005), and a boring (KAB-01) drilled through the former UST nest encountered petroleum-impacted soil and groundwater (gasoline) at the soil/groundwater interface. A site location map is included as Figure 1.

Monitoring wells KMW-01 and KMW-02 (installed by Kleinfelder) and MW-3 (installed by others) were located on the former Astro site on the southern portion of the property. Monitoring well KMW-01 was apparently destroyed during site re-development. A multi-tenant retail building currently occupies Center Square - South. Monitoring wells MW-1 and MW-2 (previously located at Astro) were abandoned on March 7, 2006, according to Ecology well reports. Monitoring wells KMW-02 and MW-3 are still present on the site. The site features, including the current and former monitoring wells, are shown in Figure 2.

The property is located in the commercial district of greater Vancouver, Washington. The property elevation is approximately 200 feet above mean sea level. An unnamed creek is located approximately 1,200-feet northeast of the property.



The unnamed creek flows east to join Salmon Creek located approximately 3,000-feet east of the property. The property is essentially level, and topography in the property vicinity slopes gently northeast, towards the unnamed creek mentioned above (U.S. Geological Survey, 1970).

### **3 GROUNDWATER MONITORING AND ANALYTICAL METHODS**

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On October 31, 2012, groundwater levels were measured in monitoring wells KMW-02 and MW-3 using an electronic water level indicator. The monitoring wells were purged and sampled following the protocols outlined in Appendix A.

Groundwater samples were placed in an ice-chilled cooler and transported under chain-of-custody documentation to Apex Labs in Tigard, Oregon for analysis. Samples were analyzed for gasoline-range petroleum hydrocarbons by Northwest Test Method NWTPH-Gx in accordance with the Ecology NFA requirements. A copy of the laboratory report and chain-of-custody form are provided in Appendix B.

## 4 GROUNDWATER MONITORING RESULTS

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On October 31, 2012, groundwater levels were measured in monitoring wells KMW-02 and MW-03. The groundwater levels were 20.8 to 21.18 feet below the top of the well casings, and the corresponding groundwater elevations were 174.81 to 174.35 feet above mean sea level, respectively.

A summary of the eighteen-month 2012 event and historic groundwater levels and elevations is presented in Table 1. The eighteen-month 2012 groundwater monitoring event groundwater elevations and non-detect petroleum hydrocarbon constituent concentrations are shown on Figure 2. The eighteen-month 2012 laboratory data is presented in Appendix B.

A summary of the eighteen-month 2012 event and historic groundwater sample analytical results is provided in Table 2. The non-detect petroleum hydrocarbon constituent laboratory analytical results from the eighteen-month 2012 monitoring event were compared to their respective MTCA Method A groundwater cleanup levels (Ecology, 2007). The MTCA Method A groundwater cleanup levels used for comparison are provided in Table 2.

Gasoline was not detected at or above the laboratory reporting limit in groundwater samples collected from monitoring wells KMW-02 and MW-3 for the current event. Gasoline petroleum hydrocarbons have not been detected in monitoring wells KMW-02 and MW-3 since April 2005 when groundwater monitoring was initiated in these two wells.



## 5 CONCLUSIONS AND RECOMMENDATIONS

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The following conclusions and recommendations are based on Kleinfelder's knowledge of the subject property from site observations, historical knowledge of site activities, site characterization, and groundwater monitoring. These conclusions and recommendations are subject to the limitations presented in this report, and may change if additional information becomes available.

Two groundwater monitoring wells (KMW-01 and KMW-02) were installed at the site by Kleinfelder for the purpose of evaluating groundwater quality. In addition, two previously existing monitoring wells, MW-1 (now abandoned) and MW-3 have also been utilized in conjunction with wells KMW-01 and KMW-02 to evaluate groundwater quality at the site. The groundwater data collected during monitoring events performed prior to February 2007 suggest that the near-surface groundwater flow direction is generally to the north-northeast, which is generally consistent with the flow direction on the adjacent site to the north. KMW-01 is inaccessible and has not been sampled since November 2005.

Based on the historic groundwater flow direction and potential onsite contaminant source areas, the monitoring well network appears to be appropriately situated for the purposes intended. KMW-01 was previously used to evaluate the up-gradient extent of petroleum-impacted groundwater, and monitoring wells KMW-02 and MW-3 are used to evaluate the down-gradient extent of potential petroleum-impacted groundwater. Concentrations of petroleum hydrocarbon-related constituents have been non-detect in monitoring wells KMW-02 and MW-3 since 2005, which indicates that the downgradient extent of impacted groundwater has been delineated and impacted groundwater appears to be very limited to the immediate vicinity of 2005 boring KAB-01 and therefore, does not extend beyond the property boundary.



Kleinfelder prepared a Disproportionate Cost Analysis (DCA) to evaluate cost / benefits for potential remediation and proportionate reduction of risk to support site closure. The DCA was submitted to the Washington Department of Ecology for review on February 23, 2009 (Kleinfelder, 2009). Owner representatives and Kleinfelder met with Ecology project manager, Scott Rose, on April 16, 2009 to discuss site closure. Kleinfelder prepared a technical memorandum for Ecology review that provided additional supporting information for site closure prior to the third quarter 2009 sampling event. Ecology approved site closure and issued a No Further Action (NFA) determination for the site on December 17, 2009. The NFA includes an environmental covenant which requires groundwater monitoring of the two site wells every 18 months. Ecology has stipulated they will provide a periodic review of the results of the groundwater monitoring and consider changing the environmental covenant to no longer require monitoring. The next sampling event is scheduled for the first quarter of 2014.

## 6 REFERENCES

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Kleinfelder, Inc., 2005. Supplemental Site Characterization Report, Gramor – Center Square, NE 20<sup>th</sup> Avenue & NE Highway 99, Lil Colonel Drive-In – Ecology Site #50743515, Astro #607 – Trail Mart – Ecology Facility #5995, Vancouver, Washington, May 12.

Kleinfelder, 2009, Feasibility Study and Disproportionate Cost Analysis, Gramor – Center Square – South: Former Astro #607 13117 NE Highway 99, Vancouver, Washington, Facility/Site No. 6943927, February 23.

Kleinfelder, 2011, First Quarter 2011 Groundwater Monitoring Report, Mears Gramor – Center Square – South: Former Astro #607 13117 NE Highway 99, Vancouver, Washington, Facility/Site No. 6943927, June 16.

U.S. Geological Survey, 1970. Vancouver, Washington, 7.5-Minute Topographic Quadrangle, Scale 1:24,000.

Washington State Department of Ecology (Ecology), 2007. Model Toxics Control Act Cleanup Regulations, Chapter 173-340-WAC: Toxics Cleanup Program, Publication No. 94-06, October 12.

## 7 LIMITATIONS

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This work was performed in a manner consistent with that level of care and skill ordinarily exercised by other members of Kleinfelder's profession practicing in the same locality, under similar conditions, and at the date the services are provided. Our conclusions, opinions, and recommendations are based on a limited number of observations and data. It is possible that conditions could vary between or beyond the data evaluated. Kleinfelder makes no other representation, guarantee or warranty, express or implied, regarding the services, communication (oral or written), report, opinion, or instrument of service provided.

This report may be used only by Mears Gramor, LLC, and the Washington Department of Ecology and only for the purposes stated for this specific engagement within a reasonable time from its issuance, but in no event later than one (1) year from the date of the report.

Kleinfelder offers various levels of investigative and engineering services to suit the varying needs of different clients. It should be recognized that definition and evaluation of geologic and environmental conditions are a difficult and inexact science. Judgments leading to conclusions and recommendations are generally made with incomplete knowledge of the subsurface conditions present due to the limitations of data from field studies. Although risk can never be eliminated, more-detailed and extensive studies yield more information, which may help understand and manage the level of risk. Since detailed study and analysis involves greater expense, our clients participate in determining levels of service that provide adequate information for their purposes at acceptable levels of risk. More extensive studies, including subsurface studies or field tests, should be performed to reduce uncertainties. Acceptance of this report will indicate that Mears Gramor, LLC, has reviewed the document and determined that it does not need or want a greater level of service than provided.



Kleinfelder assumes no responsibility or liability whatsoever for any claim, loss of property value, damage, or injury that results from pre-existing hazardous materials being encountered or present on the project site, or from the discovery of such hazardous materials. Mears Gramor, LLC, is responsible for directing all arrangements to lawfully store, treat, recycle, dispose, or otherwise handle hazardous materials, including cuttings and samples resulting from Kleinfelder's services.

**8 PROFESSIONAL AUTHENTICATION**

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This report has been prepared and reviewed by the undersigned. This report is void if original seal and signature are not present.



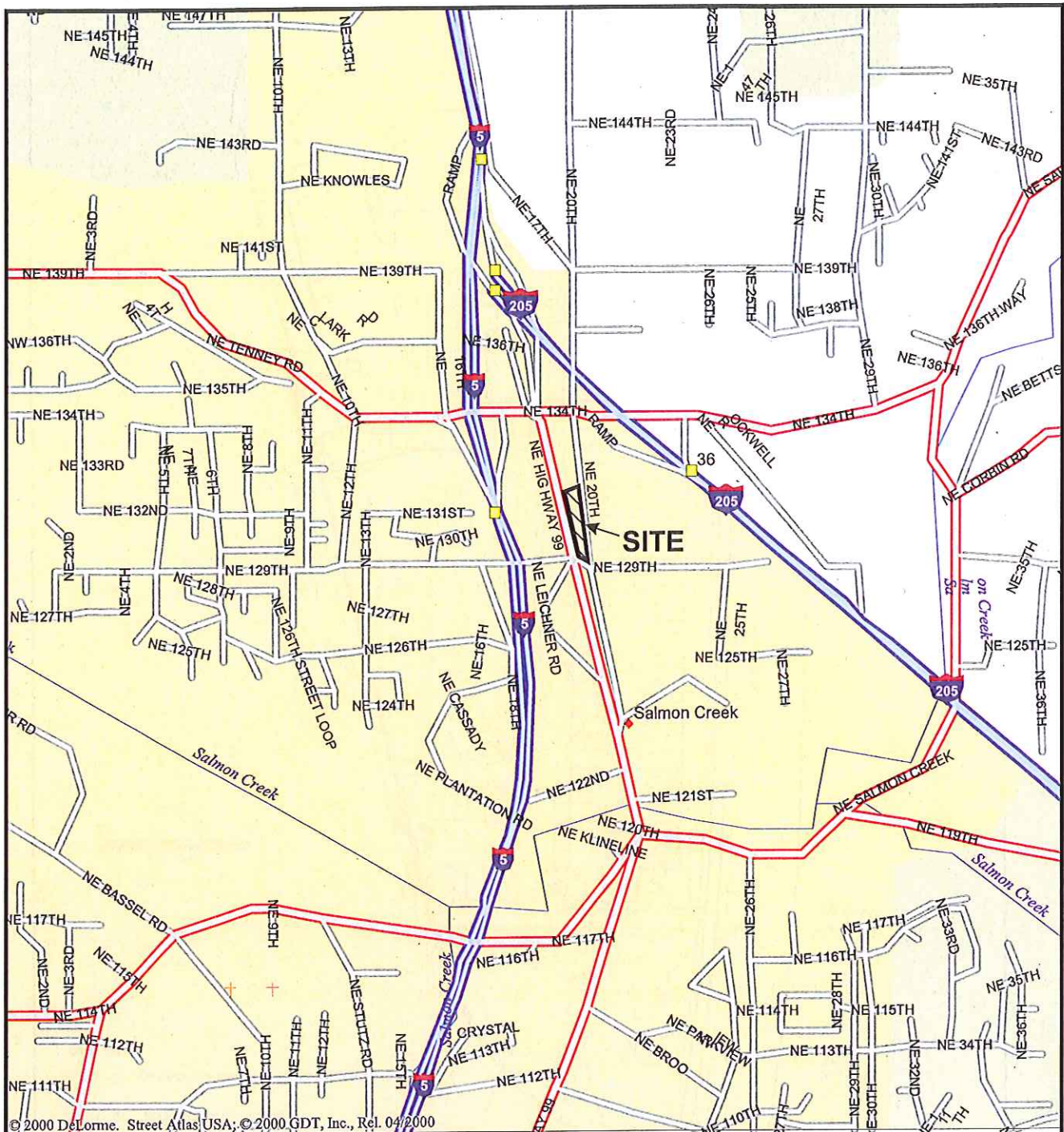
Reid F. Kenner  
Project Professional



Peter L. Stroud



Peter L. Stroud, L.E.G  
Principal Engineering Geologist



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Mag 15.00  
 Tue May 03 10:41 2005  
 Scale 1:15,625 (at center)  
 1000 Feet  
 500 Meters

- Local Road
- Major Connector
- Interstate/Limited Access
- River/Canal
- Site
- Exit

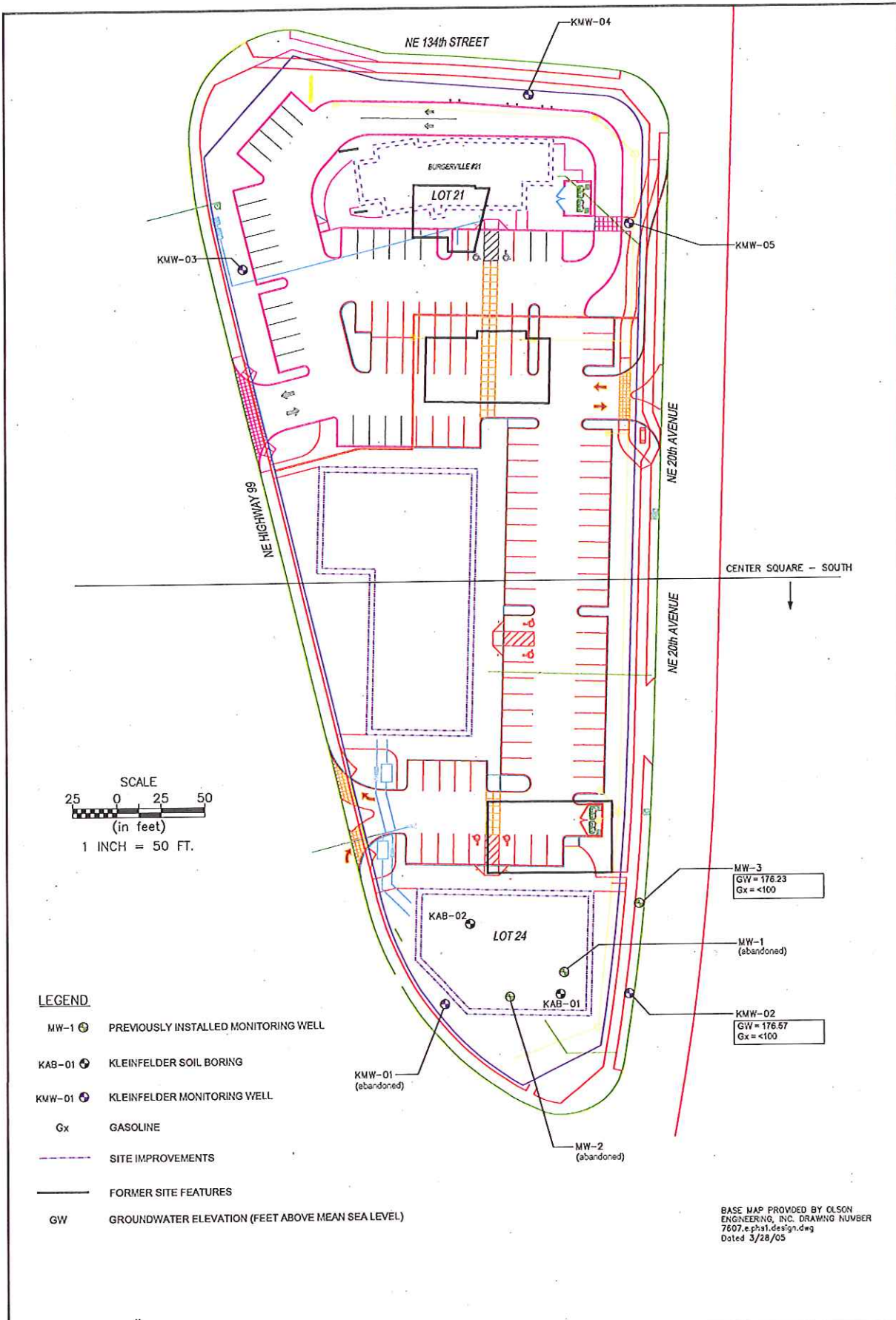


PROJECT NO.	102657
DRAWN:	10/09
DRAWN BY:	TLK
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FILE NAME:	102657F1.cdr

**SITE LOCATION MAP**

MEARS GRAMOR CENTER SQUARE - SOUTH  
 NE 20TH AVENUE AND NE HIGHWAY 99  
 VANCOUVER, WASHINGTON

FIGURE:  
**1**



**LEGEND**

- MW-1 PREVIOUSLY INSTALLED MONITORING WELL
- KAB-01 KLEINFELDER SOIL BORING
- KMW-01 KLEINFELDER MONITORING WELL
- Gx GASOLINE
- SITE IMPROVEMENTS
- FORMER SITE FEATURES
- GW GROUNDWATER ELEVATION (FEET ABOVE MEAN SEA LEVEL)

BASE MAP PROVIDED BY OLSON ENGINEERING, INC. DRAWING NUMBER 7607.e.phs1.design.dwg Dated 3/28/05



PROJECT NO.	102657	<b>SITE PLAN WITH GROUNDWATER ELEVATION DATA AND SAMPLE RESULTS - 10/31/12</b>	FIGURE <b>2</b>
DRAWN BY:	10/09		
CHECKED BY:	TLK		
FILE NAME:	CW		
	102657F2.dwg		
MEARS GRAMOR CENTER SQUARE SOUTH NE 20th AVENUE & NE HIGHWAY 99 VANCOUVER, WASHINGTON			



**TABLE 1**  
**MONITORING WELL GROUNDWATER LEVEL AND ELEVATION DATA**  
**EIGHTEEN-MONTH 2012 GROUNDWATER MONITORING REPORT**  
**MEARS GRAMOR CENTER SQUARE - SOUTH**  
**NE 20TH STREET & NE HIGHWAY 99**  
**VANCOUVER, WASHINGTON**  
**PROJECT NO. 102657**

Well Number Elevation [1] Screen Interval [2] Diameter [3] Well Depth [2]	Date Measured	Depth to Groundwater [2]	Groundwater Elevation [4]
<b>ASTRO (Previously LOT # 24, Southern)</b>			
KMW-01	04/14/2005	20.95	175.47
196.42	11/09/2005	21.33	175.09
(18-28)	02/07/2007	NM	NM
3/4	05/23/2007	NM	NM
28	11/29/2007	NM	NM
(Abandoned)	03/31/2008	NM	NM
	08/01/2008	NM	NM
	12/11/2008	NM	NM
	02/24/2009	NM	NM
	05/27/2009	NM	NM
	08/18/2009	NM	NM
KMW-02	04/14/2005	20.35	175.26
195.61	11/09/2005	20.60	175.01
(18-28)	02/07/2007	18.53	177.08
3/4	05/23/2007	19.36	176.25
28	11/29/2007	21.20	174.41
	03/31/2008	19.69	175.92
	08/01/2008	20.34	175.27
	12/11/2008	21.00	174.61
	02/24/2009	20.41	175.20
	05/27/2009	20.93	174.68
	08/18/2009	21.02	174.59
	03/04/2011	19.04	176.57
	10/31/2012	20.80	174.81
MW-01	04/14/2005	20.80	175.25
196.05	11/09/2005	21.16	174.89
NK	02/07/2007	NM	NM
4	05/23/2007	NM	NM
29.5	11/29/2007	NM	NM
(Abandoned)	03/31/2008	NM	NM
	08/01/2008	NM	NM
	12/11/2008	NM	NM
	02/24/2009	NM	NM
	05/27/2009	NM	NM
	08/18/2009	NM	NM
MW-3	04/14/2005	20.50	175.03
195.53	11/09/2005	21.16	174.37
NK	02/07/2007	19.35	176.18
2	05/23/2007	19.88	175.65
29	11/29/2007	21.41	174.12
	03/31/2008	19.90	175.63
	08/01/2008	20.61	174.92
	12/11/2008	21.28	174.25
	02/24/2009	20.65	174.88
	05/27/2009	21.18	174.35
	08/18/2009	21.33	174.20
	03/04/2011	19.30	176.23
	10/31/2012	21.18	174.35

1. Top of PVC well casing elevation in feet, surveyed above mean sea level
  2. Depth in feet, measured from top of PVC well casing.
  3. Diameter in inches.
  4. Groundwater elevation in feet, corrected for floating product, if applicable.
- NK Not Known  
 NM Not Measured



## APPENDIX A SITE ASSESSMENT METHODS

### WATER LEVEL MEASUREMENTS

Water level measurements were referenced to the surveyed elevation at the top of each monitoring well casing. Static water levels were measured in each monitoring well to an accuracy of 0.01 foot using an electronic water level indicator. The instrument emits a steady tone when the probe encounters water. The probe was lowered into the well until the instrument detected water. The tape connected to the probe was used to measure the depth to water from the reference point to within 0.01 feet.

### MONITORING WELL SAMPLING

Kleinfelder personnel sampled each groundwater monitoring well in accordance with the following protocol:

- The height of the water column within the well was calculated by subtracting the depth to water from the total depth of the well. The volume of this water column was calculated using the relationship  $V = 3.142r^2h$ , where  $V$  is the volume of water in cubic feet,  $r$  is the radius of the well in feet, and  $h$  is the height of the water column in feet.
- Prior to collecting groundwater samples, the monitoring wells were purged using one or a combination of the following equipment: 1) a non-dedicated, disposable polyethylene bailer for each well, or 2) a peristaltic pump fitted with new, disposable PVC tubing replaced at each well location. At least three casing volumes of groundwater were removed, or the wells were purged dry and allowed to recover, prior to collecting groundwater samples. Temperature, pH, and specific conductivity were monitored during well purging. Standards of known pH were used to calibrate the field meter prior to use.
- The contract laboratory prepared sample containers to conform to EPA-recommended preservation techniques for the analytes of concern.
- Groundwater samples were collected with either new, clean, disposable polyethylene bailers or peristaltic pump PVC tubing from each well (the same bailer/tubing used to purge the well, if applicable). Sample containers were open only as long as necessary to collect the samples.

- Each sample container was labeled with a unique sample number, date, time, and project number, and stored in an ice-chilled cooler for shipment to the analytical laboratory. Chain-of-custody procedures documented sample handling.
- To reduce the potential for cross-contamination, non-disposable developing and sampling equipment were washed in a trisodium phosphate solution and rinsed with distilled water. New, disposable nitrile gloves were worn and replaced at each well location, and changed as often as necessary.