ExxonMobil
Environmental Services

400 Kingsland Avenue
Brooklyn, New York 11222
Telephone: (718) 383-7374
Facsimile: (718) 389-4131
steve.p.trifiletti@exxonmobil.com

Steve Trifiletti
Project Manager

July 6, 2010

Mr. Brian Davidson
New York State Department of Environmental Conservation
Remedial Bureau B
Division of Environmental Remediation
625 Broadway, 12th Floor
Albany, New York 12233-7016

Re: Tidal Study and Hydraulic Conductivity Evaluation Work Plan
Former Pratt Oil Works
The Inland Parcels (Tract I) and Waterfront Parcels (Tract II)
Long Island City, New York

Dear Mr. Davidson:

ExxonMobil Oil Corporation ("ExxonMobil") is submitting for your review and comment the enclosed Tidal Study and Hydraulic Conductivity Evaluation Work Plan for the subject site. Three hard copies and an electronic copy are provided in accordance with Section VIII of the Consent Order (D2-1002-12-07AM) executed between ExxonMobil and NYSDEC. This report has been prepared on behalf of ExxonMobil by Kleinfelder of Bohemia, New York.

Please do not hesitate to contact me at (516) 239-5232 if you have any questions.

Very truly yours,

Steve Trifiletti
Project Manager

Enclosure

Via FEDEX Overnight

cc: S. Caruso (NYSDEC – electronic copy only)
L. Forte (A&L Cesspool Ser./Co. – hard copy only)
J. Kaplan (Waste Management of New York LLC – electronic and hard copy)
K. Lumpe (Steel Equities – hard copy only)
N. Sherman (HP Sherman Co. Inc. – hard copy only)
G. Werwaiss (Werwaiss Realty co. – hard copy only)
J. Wolf (Kleinfelder)

KLEINFELDER
Bright People. Right Solutions.

DELIVERED VIA Electronic Mail

July 6, 2010

Mr. Steve P. Trifiletti
ExxonMobil Environmental Services Company
Global Remediation - Major Projects
400 Kingsland Avenue
Brooklyn, New York 11222

Re: Tidal Study and Hydraulic Conductivity Evaluation Work Plan
Former Pratt Oil Works
The Inland Parcels (Tract I) and Waterfront Parcels (Tract II)
Long Island City, New York
NYSDEC Case No. 07-07418 (Parcel A)
NYSDEC Case No. 08-13060 (Parcel B)
NYSDEC Case No. 08-13060 (Parcel C)
NYSDEC Case No. 09-04539 (Parcel D)
NYSDEC Case No. 09-03356 (Parcel E)
NYSDEC Case No. 09-03488 (Parcel G)
NYSDEC Case No. 09-03616 (Parcel H)
NYSDEC Case No. 09-03287 (Parcel I)
Consent Order Case No. D2-1002-12-07AM
NYSDEC Remedial Tracking No. S241115

Dear Mr. Trifiletti:

Kleinfelder East, Inc. (Kleinfelder) was retained by ExxonMobil Environmental Services Company (ExxonMobil), to prepare this Tidal Study and Hydraulic Conductivity Evaluation Work Plan (Work Plan) for the above-referenced Former Pratt Oil Works, Inland Parcels (Tract I) and the Waterfront Parcels (Tract II), herein collectively referred to as the Project Area, for New York State Department of Environmental Conservation (NYSDEC)'s review and approval. Once approved, this Work Plan will be incorporated into the Order on Consent No. D2-1002-12-07 AM, which was executed between ExxonMobil Oil Corporation and the NYSDEC on July 15, 2008. This Work Plan has

One Corporate Drive, Suite 201, Bohemia, NY 11716 p | 631.218.0612 f | 631.218.0787

been reviewed by Kleinfelder Engineering, P.C. for accuracy, content and quality of presentation as described in the engineering certification provided as Attachment A.

SITE DESCRIPTION

The Project Area is located within the United States Geological Survey (USGS) 7.5-Minute Topographic Map, Brooklyn, New York, Quadrangle. The Project Area is approximately 10 to 25 feet (ft) above mean sea level (msl). Topography in the vicinity of the Project Area slopes to the southwest towards Newtown Creek and is illustrated on a Locus Plan provided on Figure 1.

The Project Area encompasses approximately 18.51 acres located adjacent to Newtown Creek. The Project Area has been subdivided into 16-lots of Block 312 since 1949. The Project Area is divided by the Long Island Rail Road (LIRR) train tracks. Properties north of the LIRR are the Inland Parcels (Tract I) (Inland Project Area) and south are the Waterfront Parcels (Tract II) (Waterfront Project Area). Each tract is further subdivided into parcels (Parcels A through I) based on property ownership. Therefore, each parcel may have more than one address. Pertinent site features including, but not limited to, block and lot, parcel identifications, property boundaries, LIRR, current buildings and structure layouts and monitoring well locations are illustrated on Figure 2.

The Project Area is bound to the south-southwest by Newtown Creek. Newtown Creek is a 3.8 mile long creek oriented along the northern Brooklyn-Queens County border and connects to the East River to the northwest. Newtown Creek is an estuarine water body that flows to the East River with a semi-diurnal tidal cycle varying from approximately 5 and 7 ft and it has been dredged to approximately 16 ft below mean low water. Surface water runoff on the Project Area generally follows surficial topography to the south-southwest toward Newtown Creek (Hydroqual, 2004).

KLEINFELDER One Corporate Drive, Suite 201, Bohemia, NY 11716 p | 631.218.0612 f | 631.218.0787

SITE GEOLOGY AND HYDROGEOLOGY

The Project Area geology observed is generally heterogeneous, consisting of deposits of sands, silt, peat, gravel, cobbles, and urban fill material. Bedrock was not encountered during previous investigations. Urban fill was observed in samples throughout the Waterfront Project Area and the southern portion of the Inland Project Area (MW-15 and MW-18) to depths ranging from 1 to 18 ft below grade (fbg). A greater thickness of fill material associated with foundations, brick, and concrete debris was observed on Waterfront Parcel A. The fill contains layers of material consisting of coal ash that extend through the northern portion of Waterfront Parcel A and Parcel B and onto the central portion of the Inland Project Area. The coal ash ranges in thickness from 2 to 8 ft. Discontinuous coal ash material is also present on the southern portions of the Waterfront Project Area.

The deposits observed in soil samples beneath the Inland Project Area are predominantly composed of sand of unknown thickness, observed to the maximum depth of investigation (25 to 37 fbg). Fill material is absent from the northeastern portion of the Project Area. Sporadic lenses of silt, gravel and cobble were observed in borings on the Inland Project Area.

Heterogeneity of the subsurface deposits observed increases from the center of the Inland Project Area towards Newtown Creek. A silt layer approximately 2 to 5 ft thick is present in the central southern portion of the Inland Project Area extending to the southwestern portion of the Waterfront Project Area. The silt layer appears to dip towards the southwest, with its highest observed elevation at approximately 10 ft above mean sea level (ft-msl) in the center of the southern Inland Project Area and the lowest observed elevation approximately -18 ft-msl along Newtown Creek. The silt is present throughout samples collected from the western portions of the Waterfront Project Area.

A deposit of peat/organic silt ranging in thickness from less than 1 foot to 4 ft was observed in samples beneath the fill material throughout the northern section of Waterfront Parcel A and onto the western section of Parcel B. The peat/organic silt

KLEINFELDER One Corporate Drive, Suite 201, Bohemia, NY 11716 p | 631.218.0612 f | 631.218.0787

deposit is underlain by the aforementioned silt layer. A sand deposit of unknown thickness underlies the silt layer. On the northern portion of Parcel B, where the peat/organic silt and silt are not present, the sand deposit is located immediately beneath the fill material. This is consistent with conditions on the eastern Inland Project Area. Lenses of silt and gravel are present sporadically throughout the northern portion of the Project Area.

The Project Area is situated between a local topographic high located to the northeast (local groundwater recharge area) and Newtown Creek (a regional groundwater discharge area). Groundwater is present beneath the Project Area in perched, water table, and semi-confined conditions. The water table is present beneath the Project Area at depths ranging from approximately 3.5 fbg along the southern portion of the Project Area (MW-13) to approximately 28.5 fbg in the northernmost portions of the Project Area (MW-22).

There are currently 25 monitoring wells on-site (MW-1 through MW-3, MW-4S, MW-4D and MW-5 through MW-24). There are 14 monitoring wells (MW-1 through MW-3, MW-4S, MW-4D and MW-5 through MW-13) on the Waterfront Project Area and 11 monitoring wells (MW-14 through MW-24) on the Inland Project Area. In general, the groundwater monitoring well screens span the water table, with the exception of monitoring wells MW-4D, MW-5, and MW-6. Monitoring well MW-4D is screened beneath an approximate 2-foot organic peat layer beneath the potentiometric surface. Monitoring wells MW-5 and MW-6 are screened beneath a silty clay semi-confining layer beneath the potentiometric surface.

Light non-aqueous phase liquid (LNAPL) was detected during the groundwater gauging event on January 22, 2010 in monitoring wells MW-2, MW-3, MW-4S, MW-5, MW-6, MW-7, MW-9, MW-12, MW-14, MW-16, MW-17, MW-19, MW-22, MW-23, and MW-24. LNAPL thickness ranged from 0.01 ft in MW-12 to 8.78 ft in MW-6. Monitoring wells MW-5 and MW-6 are screened beneath a semi-confining layer and, as such, LNAPL thickness may not be indicative of actual levels near the water table.

KLEINFELDER One Corporate Drive, Suite 201, Bohemia, NY 11716 p | 631.218.0612 f | 631.218.0787

TIDAL STUDY

The semi-diurnal tidal cycles in Newtown Creek may have an effect on hydraulic heads and LNAPL thickness in groundwater monitoring wells near the Creek. A tidal study is proposed to accomplish the following:

- Evaluate the effects of tidal fluctuations on groundwater elevations in monitoring wells located at various distances from the Creek, at the water table and the semi-confined water bearing zone; and
- Evaluate, if present, how LNAPL thickness, air/LNAPL interface and LNAPL/water interface positions fluctuate in monitoring wells as a result of tidal influence.

The tidal study will consist of the installation of Solinst Levelogger static data logging pressure transducers (static data logger) in the following monitoring wells: MW-1, MW-2 MW-4S, MW-4D, MW-6, MW-7, MW-8, MW-10, MW-12, MW-13, MW-14, MW-15, MW-18 and MW-20. Figure 3 illustrates the wells proposed to be incorporated into the tidal study. The wells listed above, with the exception of MW-4D and MW-6, contain screen intervals that bridge the water table and will be used to evaluate tidal effects on the water table. Tidal influence on the semi-confined, water-bearing zone will be evaluated using monitoring in wells MW-4D and MW-6.

A subset of the tidal study wells, including MW-2, MW-4S and MW-6, MW-7 and MW-14, contain LNAPL; the thickness of which will be monitored with a second Solinst Levelogger data logging pressure transducer affixed to a float in each well (dynamic data logger). The float will have a customized density such that it, and the pressure transducer, will remain at a fixed location relative to the LNAPL/water interface. As the LNAPL/water interface moves up or down in a well, the float and pressure transducer will move concomitantly. Changing thickness of LNAPL above the pressure transducer will be recorded by the pressure transducer affixed to the float. Furthermore, data collected by the dynamic pressure transducer will be filtered from the static pressure transducer data to yield the elevation of the water/LNAPL interface. A schematic

KLEINFELDER One Corporate Drive, Suite 201, Bohemia, NY 11716 p | 631.218.0612 f | 631.218.0787

diagram of the proposed monitoring equipment for wells containing LNAPL is provided as Figure 4.

Kleinfelder conducted a feasibility evaluation of the proposed testing scenario for wells containing LNAPL. A bench test was performed on March 4, 2010 and pilot tests were performed between March 8 and April 5, 2010. The results of testing appear to indicate that the method is a valid approach for estimating tidal influence on water levels and LNAPL thickness, if present, in monitoring wells in the Project Area.

Up to two of the wells will be equipped with Solinst Levelogger data logging pressure transducers installed in the dry portion of the casing to record atmospheric pressure changes. These measurements will be used to establish the baseline pressure contribution of atmospheric pressure relative to the submerged static and dynamic pressure transducers.

In addition to the groundwater monitoring wells, a marine piezometer will be installed and used to monitor water levels in Newtown Creek. The piezometer will consist of a two inch diameter, schedule 40 polyvinyl chloride (PVC) pipe affixed to the bulkhead and extending from the top of the bulkhead to approximately 5 feet below the low tide level. A Solinst Levelogger data logging pressure transducer will be installed in the bottom of the piezometer.

The data logging pressure transducers in the monitoring wells and marine piezometer will be set to record data at 30 minute intervals for a period of approximately one month. Approximately 2 weeks after initial deployment, data from the loggers will be retrieved to verify that the loggers are performing properly. Manual gauging of liquid levels will be performed during initial deployment, approximately two weeks after deployment, and upon retrieval of the data logging pressure transducers.

KLEINFELDER One Corporate Drive, Suite 201, Bohemia, NY 11716 p | 631.218.0612 f | 631.218.0787

Hydraulic Conductivity Evaluation

Aquifer testing is proposed to estimate values of hydraulic conductivity of the water bearing deposits beneath the Project Area. Testing is proposed on the following wells MW-1, MW-4D, MW-8, MW-10, MW-12, MW-13, MW-15, MW-18, MW-20, and MW-21. The wells were selected based on their spatial distribution across the Project Area (Figure 5) and the absence of LNAPL in the wells.

At least one week prior to slug testing, reasonable attempts will be made to remove standing sediment greater than six inches in thickness from the bottom of the wells to be used for slug testing. Sediment will be removed through bailing, pumping or vacuum extraction.

Each monitoring well listed above, with the exception of MW-4D, contains screens that bridge the water table. These wells will be tested using a manual rising head technique, wherein a "slug" of known volume will be inserted into the well and the water level allowed to stabilize. Once the water level is stable, the slug will be removed causing a rapid displacement of the water column. Water level recovery will be monitored using an In-situ Level Troll, or equivalent, data logging pressure transducer. Testing will be conducted in accordance with the relevant portions of *American Society for Testing and Materials (ASTM), Standard D4404-96, Standard Test Method (Field Procedure) for Instantaneous Changes in Head (Slug) Tests for Determining Hydraulic Properties of Aquifers*.

Monitoring well MW-4D contains a screen that is completely submerged beneath the water level affording the opportunity to use pneumatic slug testing techniques. Pneumatic testing will be conducted in accordance with the requirements of the relevant portions of *ASTM Standard D7242 - 06 Standard Practice for Field Pneumatic Slug (Instantaneous Change in Head) Tests to Determine Hydraulic Properties of Aquifers with Direct Push Ground Water Samplers*. A Solinst Levelogger data logging pressure transducer will be installed beneath the water level in the well and the top of casing sealed. Pressurized atmospheric air will be introduced into the well casing causing

KLEINFELDER One Corporate Drive, Suite 201, Bohemia, NY 11716 p | 631.218.0612 f | 631.218.0787

displacement of the water column. Once the air pressure in the well casing and water level has stabilized, the air pressure will be instantaneously released and water level recovery will be measured and recorded using the pressure transducer.

Up to three slug tests will be performed on each well. Initial displacement will be kept constant for two of the tests and varied for the third test. The pressure transducer data will be reviewed for data usability and analyzed using commercially available analytical software (Aqtesolve®).

REPORT OF FINDINGS

A report of findings will be prepared to include the study methods, summary of data collected and analysis performed, and interpretation of the results of the tidal study and hydraulic conductivity evaluation. Data files from transducers will be provided in electronic format upon written request from NYSDEC.

TENTATIVE SCHEDULE

Field activities will commence within 45 days following receipt of written NYSDEC approval of this Work Plan. The hydraulic conductivity evaluation will be performed first and is expected to take approximately two to three weeks, including sediment removal and testing activities. The tidal study is expected to commence within two weeks following completion of slug testing and last approximately one month. The report of findings will be submitted to the NYSDEC within 90 days following completion of all field activities associated with this Work Plan.

Please forward written NYSDEC comments and/or approval of this Work Plan to Kleinfelder at your earliest convenience. If you have questions or require additional information, please contact the undersigned at (631) 218-0612.

KLEINFELDER One Corporate Drive, Suite 201, Bohemia, NY 11716 p | 631.218.0612 f | 631.218.0787

Very truly yours,
Kleinfelder East, Inc.

John E. Wolf
Senior Project Manager

Daniel T. Canavan
Sr. Project Hydrogeologist

Attachments

Copy: File (16)

"Kleinfelder performed the services for this project under the Standard Procurement Agreement with Procurement, a division of ExxonMobil Global Services Company (signed on June 21, 2007). Kleinfelder states that the services performed are consistent with professional standard of care defined as that level of services provided by similar professionals under like circumstances. This report is based on the regulatory standards in effect on the date of the report. It has been produced for the primary benefit of Exxon Mobil Global Services Company and its affiliates."

REFERENCES

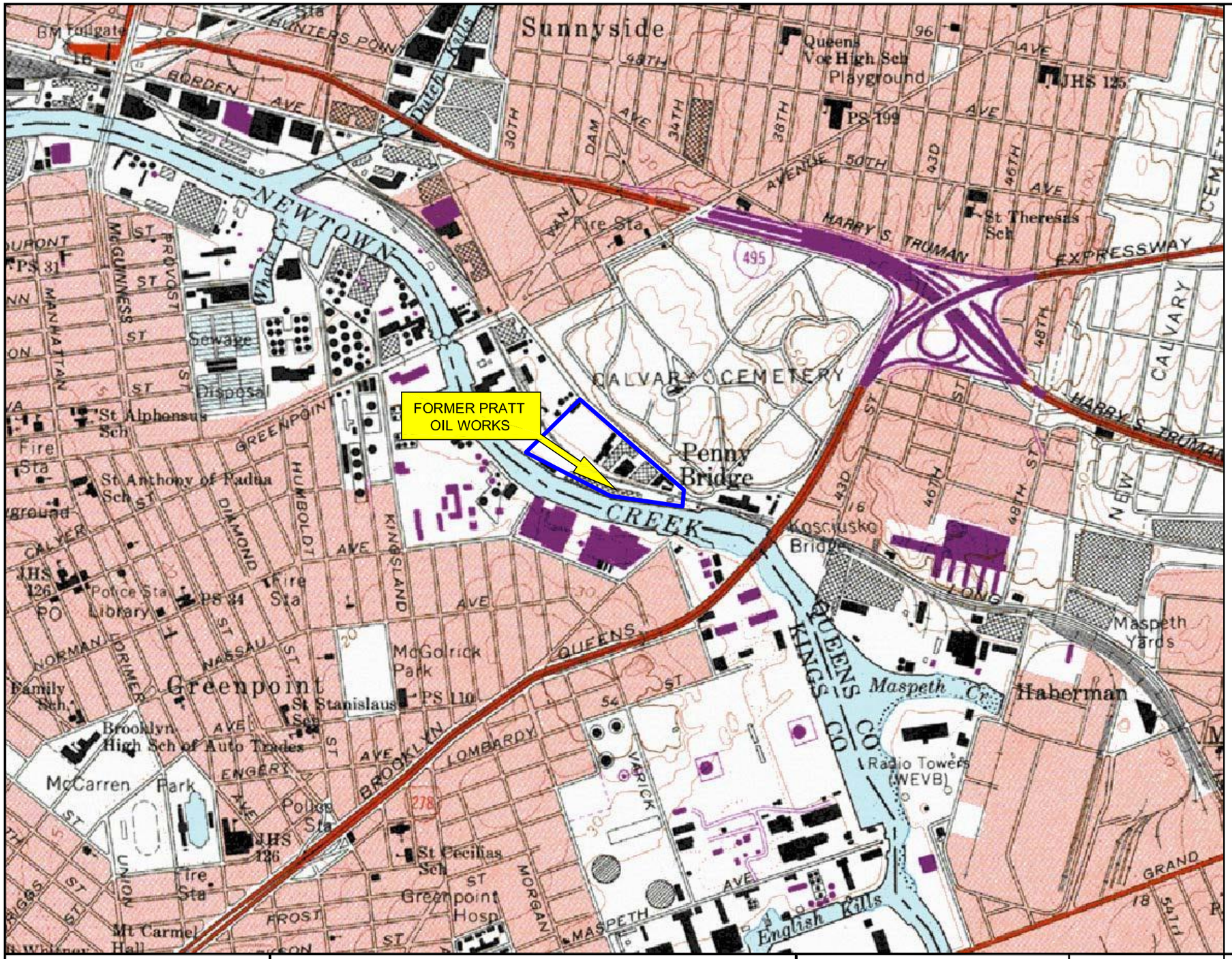
American Society for Testing and Materials, Standard D4404-96, Standard Test Method (Field Procedure) for Instantaneous Changes in Head (Slug) Tests for Determining Hydraulic Properties of Aquifers, 2002.

ASTM Standard D7242 - 06 Standard Practice for Field Pneumatic Slug (Instantaneous Change in Head) Tests to Determine Hydraulic Properties of Aquifers with Direct Push Ground Water Samplers, 2006.

Hydroqual, *Use and Standards Attainment Project Preliminary Water body/Watershed Characterization Report, Newtown Creek, February 4, 2004.*

KLEINFELDER One Corporate Drive, Suite 201, Bohemia, NY 11716 **p** | 631.218.0612 **f** | 631.218.0787

FIGURES



0 500 1,000 2,000

SCALE (feet)

APPROXIMATE LOCATION OF FORMER PRATT OIL WORKS

N

LATITUDE: 40° 43' 47.32" N

LONGITUDE: 73° 56' 08.26" W

SOURCE:
USGS 7.5' SERIES TOPOGRAPHIC MAP,
"BROOKLYN, NY QUADRANGLE
PHOTOREVISED 1979"

QUADRANGLE LOCATION

KLEINFELDER
Bright People. Right Solutions.
www.kleinfelder.com

PROJECT NO.	108988
DRAWN:	05/19/2010
DRAWN BY:	JR
CHECKED BY:	
FILE NAME:	

LOCUS PLAN

FORMER PRATT OIL WORKS
THE INLAND PARCELS (TRACT I)
THE WATERFRONT PARCELS (TRACT II)
LONG ISLAND CITY, NEW YORK

FIGURE
1

BOHEMIA, NY

N

0 40 80
Feet

1 inch = 80 feet

KLEINFELDER
Bright People. Right Solutions.
www.kleinfelder.com

PROJECT NO.	108988
DRAWN:	05/19/2010
DRAWN BY:	J.R.
CHECKED BY:	
FILE NAME:	

AERIAL PLAN

FORMER PRATT OIL WORKS
THE INLAND PARCELS (TRACT I)
THE WATERFRONT PARCELS (TRACT II)
LONG ISLAND CITY, NEW YORK

FIGURE
2

SOURCE: MICROSOFT AERIAL IMAGERY 2006

N

0 30 60
Feet

NOTES:
1. MONITORING WELLS MW-1, MW-2, MW-4S, MW-4D, MW-6, MW-7, MW-8, MW-10, MW-11, MW-13, MW-14, MW-15, MW-18, AND MW-20 WILL BE USED TO MONITOR LIQUID LEVELS DURING THE TIDAL STUDY.

KLEINFELDER
Bright People. Right Solutions.
www.kleinfelder.com

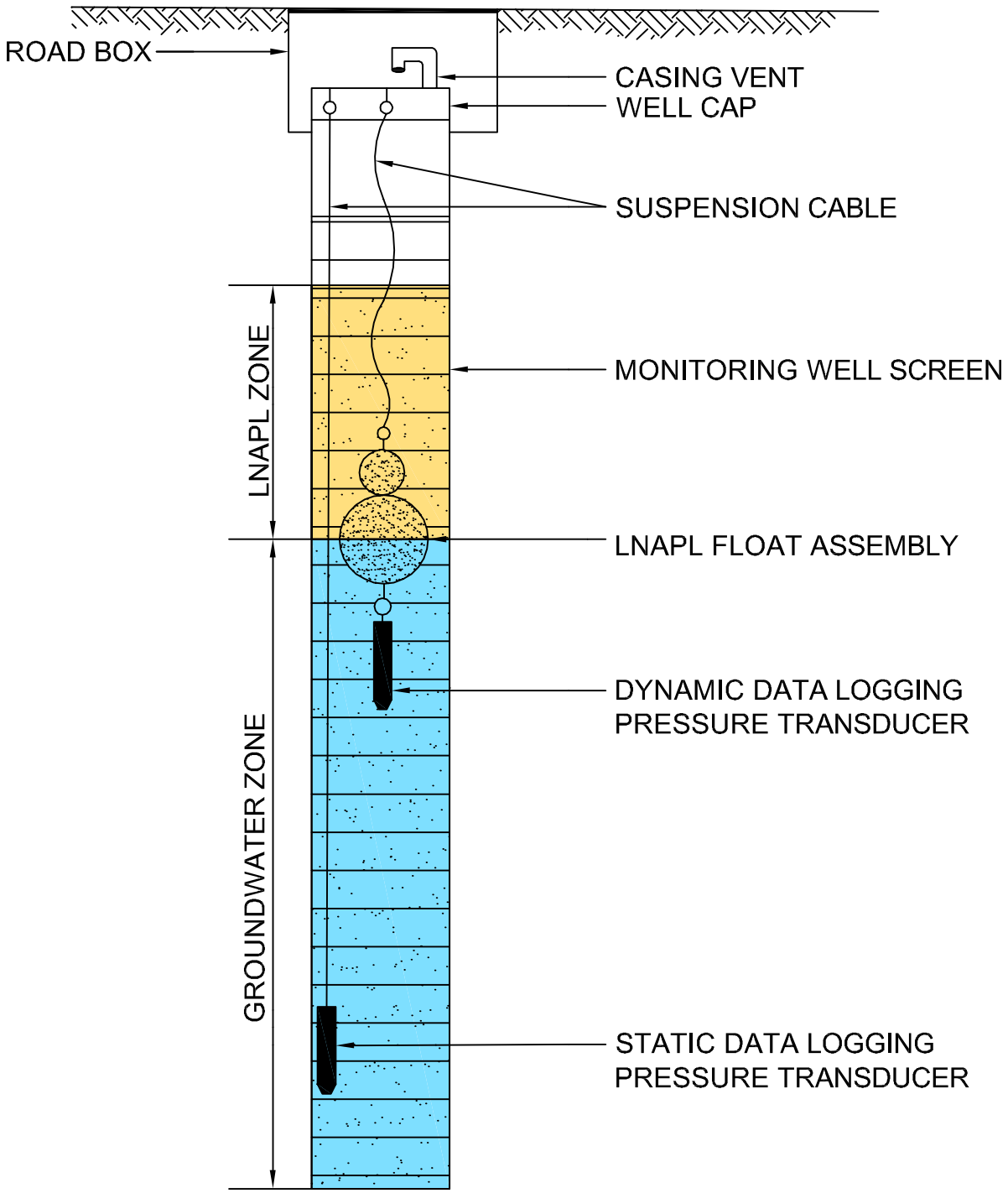
PROJECT NO.	108988
DRAWN:	J.R.
DRAWN BY:	05/19/10
CHECKED BY:	J.W.
FILE NAME:	

TIDAL STUDY
MONITORING WELL NETWORK

FORMER PRATT OIL WORKS
THE INLANDS PARCELS (TRACT I)
THE WATERFRONT PARCELS (TRACT II)
LONG ISLAND CITY, NEW YORK

FIGURE
3

PLOTTED: 20 May 2010, 8:16am, JRockwood



LNAPL - LIGHT NON-AQUEOUS PHASE LIQUID

NOT TO SCALE

ALBUQUERQUE, NM

KLEINFELDER
Bright People. Right Solutions.
www.kleinfelder.com

PROJECT NO.	108988
DRAWN:	5/19/2010
DRAWN BY:	PD
CHECKED BY:	JR
FILE NAME:	108988_DIA.dwg

TIDAL STUDY WELL MONITORING EQUIPMENT

FORMER PRATT OIL WORKS
THE INLAND PARCELS (TRACT 1)
THE WATER FRONT PARCELS (TRACT 2)
LONG ISLAND CITY, NEW YORK

FIGURE
4

QUEENS COUNTY

MW-20
SB-1
TP-2
TP-1
MW-1
SB-2/MW-6
TP-4
SB-5/MW-5
MW-2
TP-3
SB-4
TP-5
SB-3
MW-15
MW-22
SB-13/MW-24
MW-14
MW-16
MW-17
TP-12
SB-14/MW-23
TP-13
SB-15
TP-14
MW-19
SB-7
SB-8
WATERFRONT PARCEL A
MW-3
MW-4D
MW-4S
TP-7
MW-4
TP-6
TP-UTILITY
MW-18
SB-6/MW-7
SB-9
TP-8
MW-9
TP-9
SB-10
NEWTOWN CREEK
MW-8
MW-12
SB-11
TP-10
MW-21
MW-10
TP-11
MW-11
SB-12/MW-13
KINGS COUNTY
(BROOKLYN)
WATERFRONT PARCEL B

LEGEND

- MONITORING WELL LOCATION
- ABANDONED/DESTROYED MONITORING WELL LOCATION
- SOIL BORING LOCATION
- TEST PIT LOCATION
- INDICATES NAPL DETECTED/OBSERVED DURING SOIL SAMPLING OR WELL GAUGING
- INDICATES SLUG TESTING TO BE PERFORMED ON MONITORING WELL

SOURCE: MICROSOFT AERIAL IMAGERY 2006

N

0 30 60
Feet

NOTES:
1. SLUG TESTING WILL BE PERFORMED ON MONITORING WELLS MW-1, MW-4D, MW-8, MW-10, MW-11, MW-13, MW-15, MW-18, MW-20, AND MW-21.

KLEINFELDER
Bright People. Right Solutions.
www.kleinfelder.com

PROJECT NO.	108988
DRAWN:	J.R.
DRAWN BY:	05/19/10
CHECKED BY:	J.W.
FILE NAME:	

SLUG TESTING MONITORING WELL NETWORK

FORMER PRATT OIL WORKS
THE INLANDS PARCELS (TRACT I)
THE WATERFRONT PARCELS (TRACT II)
LONG ISLAND CITY, NEW YORK

FIGURE
5

ATTACHMENT A

ENGINEERING CERTIFICATION

TIDAL STUDY AND HYDRAULIC CONDICTIVITY EVALUATION
The Inland Parcels (Tract I) and Waterfront Parcels (Tract II)
Former Pratt Oil Works
Long Island City, New York

ENGINEERING CERTIFICATION

This report has been reviewed by Kleinfelder Engineering, P.C. for accuracy, content and quality of presentation. The Education Law of the State of New York prohibits any person from altering anything in the report in anyway unless it is under the direction of the licensed professional engineer. Where such alterations are made, the professional engineer must sign, seal, date and describe the full extent of the alteration (NYS Education Law Section 7209-2).

Justin R. Moses, P.E.
Vice President and Secretary
Kleinfelder Engineering, P.C.

7/6/10
Date