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M E M O R A N D U M

TO: Dale and Jeanette Erickson **DATE:** November 3, 2016

CC: Dale R. Myers, Washington Department of Ecology

FROM: Chris Carter, Principal Scientist
Tim Brown, Associate Hydrogeologist, LHG

SUBJECT: Summary of Brooklyn Chevron No. 9-0129 Ecology File Review and Groundwater Flow

SoundEarth Strategies, Inc. (SoundEarth) has prepared this memorandum and attachments to provide a brief summary of environmental conditions documented at the Brooklyn Chevron No. 9-0129 property located at 4700 Brooklyn Avenue Northeast in Seattle, Washington (the Chevron property). It is based on reports prepared by others. It contains our opinion regarding whether petroleum hydrocarbon-impacted groundwater originating from the Chevron property appears to be migrating to the property located at 4557 Brooklyn Avenue Northeast (the Erickson property).

Attachment A provides a summary of the reports that SoundEarth reviewed at the Washington Department of Ecology's (Ecology) Northwest Regional Office for the Chevron property. The Chevron property is located at the northeastern corner of the intersection of Brooklyn Avenue Northeast and Northeast 47th Street, northeast of the Erickson property. The Erickson property is located at the southwestern corner of the intersection of Brooklyn Avenue Northeast and Northeast 47th Street.

Previous work by others at the Chevron property revealed that there is light non-aqueous phase liquid (LNAPL) beneath the southwestern corner of the Chevron property and likely in the adjoining right-of-ways (ROWs) of Brooklyn Avenue Northeast and Northeast 47th Street (Attachment A). There is not sufficient data to fully define the extent of the LNAPL to the west and south of the Chevron property; however, a review of the groundwater data and soil stratigraphy for both the Chevron property and for the Erickson property, which review was conducted by a SoundEarth licensed hydrogeologist, concluded that the groundwater flow direction at the Chevron property trends toward the southeast, away from the Erickson property (Attachment B). This conclusion is consistent with the results of work performed at the Chevron property by Leidos Engineering, LLC (Leidos) in 2014 (Attachments A and C). The groundwater flow direction at the Chevron property was determined by Leidos to be toward the southeast on June 22, 2014, at a gradient ranging from 0.1 to 0.003 foot per foot (ft/ft; Attachment C).

Additionally, historical data collected from a monitoring well in the vicinity of the northeast corner of the Erickson property (well MW2) has demonstrated that concentrations of gasoline-range petroleum hydrocarbons (GRPH) and benzene, ethylbenzene, and xylenes (BTEX) constituents have not been detected above laboratory reporting limits or applicable Model Toxics Control Act Method A cleanup levels during quarterly monitoring events conducted since March 2011. Concentrations of GRPH and

benzene that historically exceeded MTCA Method A cleanup levels in that well were detected during earlier years of the operation of an air sparging/soil vapor extraction system that was in use at the Erickson property between 1997 and 2000 and between February 2005 and August 2014 for purposes of targeting a past release from a former Mobil gasoline service station on the Erickson property.

Based on the groundwater flow direction toward the southeast from both the Chevron property and the Erickson property as inferred by SoundEarth (Attachment B) and the calculated southeasterly groundwater flow direction reported by Leidos at the Chevron property in June 2014 (Attachment C), together with the absence of any apparent petroleum hydrocarbon contaminated groundwater beneath the northeastern portion of the Erickson Property since March 2011, there does not appear to be petroleum hydrocarbon-impacted groundwater originating from the Chevron property that is extending southwest onto the Erickson property.

SoundEarth appreciates the opportunity to provide you with technical assistance on this project. If you have any questions or would like to discuss the content of this memorandum please call us at 206-306-1900.

Attachments: A, Summary Table of Ecology Documents Reviewed
B, SoundEarth Figure of Groundwater Gradients at the Chevron Property and the Erickson Property
C, Chevron Service Station No. 90129 June 22, 2014, Potentiometric Map by Leidos

cc: Dale R. Myers, Washington State Department of Ecology

CGC/CMC:rt

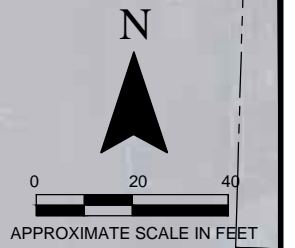
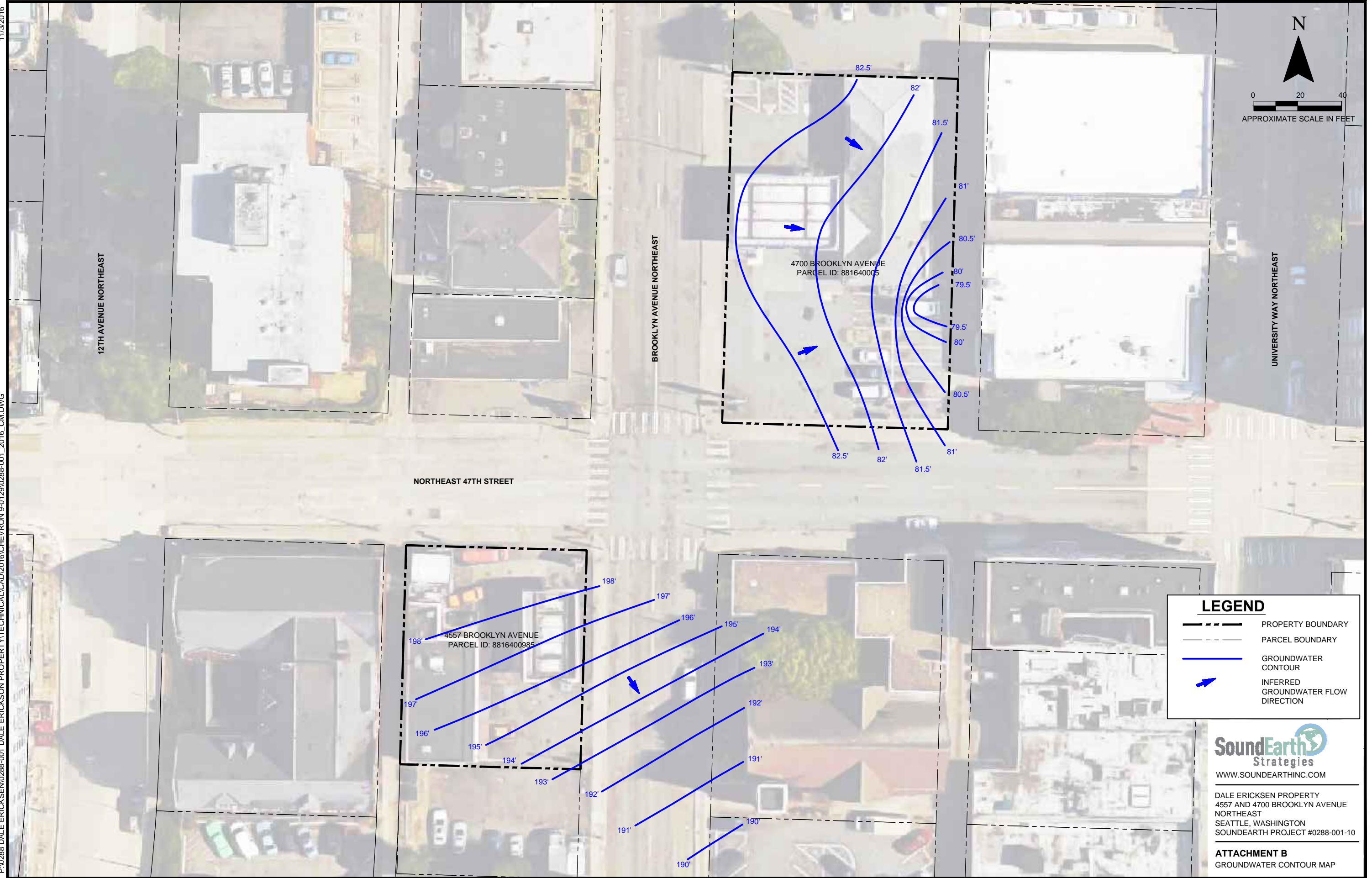
ATTACHMENT A
SUMMARY TABLE OF ECOLOGY DOCUMENTS REVIEWED

Ecology Documents

5-Apr-16

Year	Document Title	Author	Summary
2016	Conceptual RI/FS Draft Remedial Action Work Plan	The Riley Group	For enrollment in the VCP through Ecology and to satisfy the Seattle DCI- Correction Notice #1 (Soil Contamination). Seeking a NFA. FH Brooklyn LLC intends to demolish the service station and store and construct a six-story commercial/apartment building with one level of underground parking. Remedial excavation to depths of at least 23 feet bgs to remove contaminate soils, LNAPL, and contaminated groundwater underlying the property.
2016	VCP Application	The Riley Group	UST information can be found here.
2016	VCP Agreement	The Riley Group	
2016	GW Sampling	The Riley Group	Four monitoring wells (MW3, MW6, MW9, MW13) were sampled for HVOCs in January 2016. MW9 and MW 13 tested above cleanup levels for cis 1,2 DCE and VC.
2015	Baseline Environmental Assessment	The Riley Group	Current fuel system installed in 1991. (Two double-walled 12,000- gallon gasoline USTs and one double-walled 12,000- gallon diesel UST on the southwest portion of the property). Five different historical service stations dating back to at least 1964. Nine test probes (P1-P9) were advanced to depths between 5 to 22 feet bgs in February 2015. Probe logs are attached. Soil and groundwater contaminated with petroleum is known to be present on the site.
2014	GW Monitoring	Leidos Engineering, LLC	Sampling event June 2014. Separate-phase hydrocarbons (SPH) were present in MW-9 through MW-13 and those wells were not sampled. Finding included TPH-GRO and benzene detected above MTCA Method A cleanup levels in wells MW-3, MW-4, and MW-16.
2011	Site Assessment	SAIC Energy, Environment & Infrastructure, LLC	One soil boring was completed (SB-1) and was not completed as a monitoring well.
2001	Supplemental Environmental Investigation	Delta Environmental Consultants, Inc.	Two additional monitoring wells (MW-15 and MW-16) were installed. Soil was below MTCA and groundwater from MW-16 was above for TPH-G, benzene, ethylbenzene, and total xylenes.
1995	Vapor Extraction System Monitoring	Emcon	From March 23 to June 7, 1995; 920 pounds of volatile hydrocarbons were removed from the site.
1992	Stage II Vapor Recovery System Installation	Pacific Environmental Group, Inc.	Two soil samples were collected during the investigation, one from an excavation trench and the other sample from stockpiled soil associated with the excavation area. Concentrations of TPH-G in both samples were above MTCA Method A cleanup levels.
1990	Subsurface Hydrocarbon Study	Geo Engineers	Petroleum-hydrocarbon was first encountered at the site during the removal and replacement of three gasoline USTs in December 1989. TPH-G and BTEX were detected above MTCA Method A cleanup levels in the UST excavations and approximately 900 cubic yards of soil was removed. 15 soil boring and 14 monitoring wells were installed in January 1990. SPH were present in MW-4 and MW-12. An ICU was installed in 1990 and removed in 1991. Air sparging units were installed in vapor extraction wells MW-4 and MW-12 in 1991. Also installed a groundwater aeration line to recover the volatile organics within the SVE system on MW-12.

ATTACHMENT B
SOUNDEARTH FIGURE OF GROUNDWATER GRADIENTS AT THE
CHEVRON PROPERTY AND THE ERICKSON PROPERTY



LEGEND

- PROPERTY BOUNDARY
- - - PARCEL BOUNDARY
- GROUNDWATER CONTOUR
- ➔ INFERRED GROUNDWATER FLOW DIRECTION

SoundEarth Strategies
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DALE ERICKSEN PROPERTY
4557 AND 4700 BROOKLYN AVENUE
NORTHEAST
SEATTLE, WASHINGTON
SOUNDEARTH PROJECT #0288-001-10

ATTACHMENT B
GROUNDWATER CONTOUR MAP

ATTACHMENT C
CHEVRON SERVICE STATION NO. 90129 JUNE 22, 2014,
POTENTIOMETRIC MAP BY LEIDOS

