SITE HAZARD ASSESSMENT
WORKSHEET 1

SITE INFORMATION:

Name: Lacey Market Square
Address: 700 Sleater Kinney Road SE, Lacey, WA 98503
Section/Township/Range: S20/T18N/R1W
Latitude/Longitude: 47.03905,-122.83107
Parcel Number: 61030000100
Ecology FSID: 9945327
Cleanup Site ID: 472
Date Scored: October 27, 2015

Site assessed/ranked for the February 2016 update.

SITE DESCRIPTION:

The Lacey Market Square shopping center is a 19.54 acre parcel located at 700 Sleater Kinney Road SE in Lacey, WA (parcel number 61030000100). Currently, Fred Meyers is the anchor store around which a variety of banks, salons, restaurants, and similar commercial businesses are located on this site. Prior to current development, this parcel contained other commercial businesses including a drive-in movie theatre, a rental car pickup location, an insurance company, and an ice cream shop. Current onsite buildings were constructed between 1989 and 1992 and the majority of the site is paved, with some minimal landscaping.

The surrounding area is primarily commercial in nature. In particular, the southernmost portion of this parcel boarders a dry cleaning store (4224 Pacific Ave SE, Parcel #11820120500), known as Howard's Cleaners, that has been operating in its current location since 1975. Currently, Howard's Cleaners is the only active dry cleaner within a one-quarter mile radius of this site. The Lacey Market Square parcel has never contained a dry cleaning facility (determined by reviewing detailed rent rolls and city directory documents). Between 1963 and 1982, a Plaza Cleaners was located 150 feet to the northwest of Howard's Cleaners, which is down gradient (assumed) from both Howard's Cleaners and Lacey Market Square.

On Howard's Cleaner's northern property line, a storm water conveyance runs between the shopping center and the dry cleaning business in an alleyway. This includes a catch basin and subsurface piping. Surface topography slopes north from Howard's Cleaners towards the Lacey Market Square, and the alley itself drains into the storm water catch basin. Paved asphalt surfaces in this alley (as of 2003 and 2007) were in good condition with no signs of cracking, chemical erosion, or staining.

Groundwater is assumed to flow in a northwest direction from Howard's Cleaners onto the Lacey Market Square parcel (based on topography, location of major water ways, and groundwater sampling, not groundwater measurements from permanent survey monitoring wells). Groundwater has been encountered at 15 feet below ground surface (bgs). Soils at this site include fine grained sand to a depth of approximately nine feet bgs, cobbles from nine to ten feet bgs, and fine grained silty sand interbedded with gravel from 10 to 20 feet bgs.

PREVIOUS INVESTIGATIONS:

March 2002: The Washington State Department of Ecology (Ecology) Hazardous Waste Department cited Howard's Cleaner's for releasing at least ten gallons of corrosive chemicals into the storm-water catch basin located in the alleyway behind their property.

December 2003: Waterstone, Inc. (Waterstone), an environmental consultant group hired by the Lacey Market Square property owners, conducted a soil and groundwater investigation along the shared property line of the shopping center and Howard's Cleaners. The goal of this investigation was to determine whether Howard's Cleaner's release of

chemicals to the storm water catch basin impacted the soil or groundwater underlying the Lacey Market Square property. General site observations at this time indicated that waste materials and used store fixtures from Howard's Cleaners were stored outside in the rear alley.

Five soil and groundwater borings (B1-B5) were completed (Drilling by Cascade Drilling, Inc.) to a depth of 20 feet bgs in the area immediately adjacent to Howard's Cleaners, including the shared alley and front parking lot. Soil samples were collected at both 5 and 10 feet bgs and groundwater was encountered at 15 feet bgs. Augers were advanced to 20 feet bgs and a temporary groundwater well was constructed in each boring to allow for groundwater sampling. Well casings were removed after sampling, and boreholes were backfilled with bentonite chips, rehydrated, and resurface with concrete. Soil and groundwater was analyzed for volatile organic compounds (VOCs) using EPA method 8260B by Del Mar Analytical Laboratory (Irvine, CA). This analysis included testing for PCE (tetrachloroethylene aka perchloroethylene), a dry cleaning solvent, in addition to TCE (trichloroethylene) and cis-1,2-DCE (1,2-Dichloroethene (Z)), both common breakdown products of PCE. Results show that dry cleaning chemicals are present on the site at levels above MTCA Method A Cleanup Levels for soil and groundwater.

Of the ten soil samples, no contamination of TCE or cis-1,2-DCE was detected (<2 ppb). However, eight samples contained detectable limits (<2 ppb) of PCE, with two of those samples containing levels above the MTCA Method A Soil Cleanup Level for Unrestricted Land Uses (MTCA Method A Soil Cleanup Levels).

In all of the five groundwater samples, PCE was detected above MTCA Method A Cleanup Levels for Groundwater (MTCA Method A Groundwater Cleanup Levels). In addition, TCE was detected in all groundwater samples, with four of those samples above MTCA Method A Groundwater Cleanup Levels. Cis-1,2-DCE, which has no corresponding MTCA Method A Cleanup Levels, was detected in three of the groundwater samples.

Laboratory Results from December 2003 Sampling					
Boring ID	Matrix	Depth (feet bgs)	Detected VOCs (ppb)		
			PCE	TCE	Cis-1,2-DCE
B1	Soil	5	<2	<2	<2
	Soil	10	3.8	<2	<2
	Groundwater	15	170	7.5	<2
B2	Soil	5	<2	<2	<2
	Soil	10	5.8	<2	<2
	Groundwater	15	190	5.8	<2
B3	Soil	5	69	<2	<2
	Soil	10	3	<2	<2
	Groundwater	15	77	3.6	2.2
B4	Soil	5	69	<2	<2
	Soil	10	7	<2	<2
	Groundwater	15	40	5.2	10
B5	Soil	5	11	<2	<2
	Soil	10	14	<2	<2
	Groundwater	15	77	5.6	2.1
MTCA Method A Cleanup Levels	Soil		50	30	n/a
	Groundwater		5	5	n/a

April 2005: Thurston County Environmental Health completed a technical assistance inspection of Howard's Cleaners and recorded the presence of PCE (300 gallons of product), separator waste (60 gallons), filters (200 pounds, removed by vendor), and some still bottoms (removed by vendor) on site. No violations found.

August 2007: In August of 2007, Waterstone completed a follow up subsurface investigation of the site. Site observations at this time noted that no more waste material was stored outside of Howard's Cleaners.

Gregory Drilling, Inc. installed five new borings (B2-B, B3-B, B4-B, B6, and B7) to approximately 20 feet bgs. All borings were located in the same general area as the first investigation, with the first three borings placed adjacent to previous borings, and the last two located farther into the Lacey Market Square property. Again, soil samples were collected at 5 and 10 feet bgs and once groundwater was encountered, groundwater samples were taken. Boreholes were backfilled with bentonite chips, rehydrates, and resurfaced with concrete. B6 and B7 borings did not have soil samples collected, and were installed to monitor the size of the groundwater contamination plume and estimate the direction of groundwater flow. Samples were analyzed by Friedman and Bruya Laboratories (Seattle, WA). Analyzed for VOCs by EPA Method 8260B.

Of the three soil samples collected, no TCE or cis-1,2-DCE was detected. One soil sample contained detectable levels of PCE above MTCA Method A Soil Cleanup Levels. In groundwater, all five samples contained PCE over MTCA Method A Groundwater Cleanup Levels. In addition, all five samples contained detectable levels of TCE, with only one over MTCA Method A Groundwater Cleanup Levels. No cis-1,2-DCE was detected in the groundwater samples.

Laboratory Results from August 2007 Sampling					
Boring ID	Matrix	Depth (feet bgs)	Detected VOCs (ppb)		
			PCE	TCE	Cis-1,2-DCE
B2-B	Soil	5	<25	<25	<25
	Soil	10	<25	<25	<25
	Groundwater	15	**220**	**5.3**	<1
B3-B	Soil	5	<25	<25	<25
	Soil	10	<25	<25	<25
	Groundwater	15	**62**	1.4	<1
B4-B	Soil	5	**470**	<30	<50
	Soil	10	<25	<30	<50
	Groundwater	15	**72**	**5.2**	10
B6	Soil	5	n/a	n/a	n/a
	Soil	10	n/a	n/a	n/a
	Groundwater	15	**66**	2	<1
B7	Soil	5	n/a	n/a	n/a
	Soil	10	n/a	n/a	n/a
	Groundwater	15	**63**	2.7	<1
MTCA Method A Cleanup Levels	Soil		50	30	n/a
	Groundwater		5	5	n/a

Listing/Ranking: In August of 2008, the contamination above MTCA Method A Cleanup Levels was reported to Ecology (ERTS#607794). In February of 2009, both Lacey Market Square and Howard's Cleaners received Early Notice Letters from Ecology, stating that these parcels had been listed on the Confirmed and Contaminated Sites List. In December of 2009, Ecology ranked Howard's Cleaners as a 1 out of 5, where 1 represents the highest relative risk. This hazard ranking is an estimation of the potential threat to human health and/or the environment, relative to all other Washington State sites assessed at the time.

CONCLUSION:

PCE, a dry cleaning solvent, was detected above state cleanup levels in both groundwater and soil samples on the Lacey Market Square shopping center parcel adjacent to Howard's Cleaners. Due to the historic and current location of the dry cleaners, the historic malpractices at the dry cleaner, and the estimated groundwater direction, it has been assumed likely that the detected dry cleaning solvent originated from Howard's Cleaners. Between these two parcels, a subsurface storm drain system collects runoff water, also likely associated with the contamination. Contamination has only been confirmed on the Lacey Market Square, as no documented sampling has been performed on the

Howard's Cleaners parcel. In addition, it is unknown where the storm drains to and if other parcels may be contaminated. No remediation activities have occurred related to this contamination.

SPECIAL CONSIDERATIONS:

As this site is developed with structures and pavement, surface water and air routes were not considered in this ranking.

ROUTE SCORES:

Surface Water/Human Health:	**Not Scored**	Surface Water/Environmental:	**Not Scored**
Air/Human Health:	**Not Scored**	Air/Environmental:	**Not Scored**
Groundwater/Human Health:	**71.6 → 5**		

Overall Rank: **HH→4, Env→NA = 2**

WORKSHEET 2
Route Documentation

1. SURFACE WATER ROUTE – NOT SCORED

a. List those substances to be considered for scoring: Source:

b. Explain basis for choice of substance(s) to be used in scoring.

c. List those management units to be considered for scoring: Source:

d. Explain basis for choice of unit to be used in scoring:

2. AIR ROUTE – NOT SCORED

a. List those substances to be considered for scoring: Source:

b. Explain basis for choice of substance(s) to be used in scoring:

c. List those management units to be considered for scoring: Source:

d. Explain basis for choice of unit to be used in scoring:

3. GROUNDWATER ROUTE

a. List those substances to be considered for scoring: Source: 1, 2, 11

PCE and TCE

b. Explain basis for choice of substance(s) to be used in scoring:

Documented presence of PCE and TCE in excess of MTCA Method A Cleanup Levels in groundwater

c. List those management units to be considered for scoring: Source: 1, 2, 11

Contaminated groundwater

d. Explain basis for choice of unit to be used in scoring:

Documented presence of PCE and TCE in excess of MTCA Method A Cleanup Levels in groundwater

WORKSHEET 6
Groundwater Route

1.0 SUBSTANCE CHARACTERISTICS

1.2 HUMAN TOXICITY

	Substance	Drinking Water Standard (µg/L)	Value	Acute Toxicity (mg/ kg-bw)	Value	Chronic Toxicity (mg/kg/day)	Value	Carcinogenicity		Value
								WOE	PF*	
1	Tetrachloroethene (PCE)	5	8	800 (rat)	5	0.01	5	0.051	B2 (0.8*0.051= 0.0408)	3
2	Trichloroethene (TCE)	5	8	2402 (mus)	3	--		0.011	B2 (0.8*0.011= 0.0088)	3

* *Potency Factor, ND-No Data*

Source: 1, 2
Highest Value: 8
(Max = 10)
Plus 2 Bonus Points? Yes
Final Toxicity Value: 10
(Max = 12)

1.2 MOBILITY

Cations/Anions [Coefficient of Aqueous Migration (K)]	Solubility (mg/L)
1=	**1=** Tetrachloroethene (PCE) = 150 mg/L = Value 2
2=	**2=** Trichloroethene (TCE) = 1,100 mg/L = Value 3

Source: 1, 2
Value: 3
(Max = 3)

1.1 SUBSTANCE QUANTITY (VOLUME):

Explain basis: Unknown, Value 1	Source: 2, 11 **Value: 1** (Max=10)

1.0 MIGRATION POTENTIAL

		Source	Value
2.1	**Containment (explain basis):** Contaminated soil	2, 11	**10** (Max = 10)
2.2	**Net precipitation:** November – April average total precipitation: 38.58", November – April average evapotranspiration rate: 5.33", 38.58" – 5.33" = 33.25"	2, 3, 4, 5	**4** (Max = 5)
2.3	**Subsurface hydraulic conductivity:** "fine grained sand, cobbles, fine grained silty sand interbedded with gravel"	2, 11	**3** (Max = 4)
2.4	**Vertical depth to groundwater:** 15 feet bgs, and contamination confirmed in groundwater at the site.	2, 11	**8** (Max = 8)

2.0 TARGETS

		Source	Value
3.1	**Groundwater usage:** Public supply, alternative sources available	2, 5, 6, 7	**4** (Max = 10)
3.2	**Distance to nearest drinking water well:** 2500ft, Rainier View Park Addition	2, 12	**3** (Max = 5)
3.3	**Population served within 2 miles: √ pop. =** 668 private wells*3 people/private well + 128,862 public users (including Hoffman Well #3, and College and 32nd)>10,000	2, 6, 7	**100** (Max = 100)
3.4	**Area irrigated by (groundwater) wells within 2 miles: 0.75** √(816.2 acres irrigated)=21.4	2, 6, 7	**22** (Max = 50)

3.0 RELEASE

	Source	Value
Explain basis for scoring a release to groundwater: Confirmed groundwater contamination	2, 11	**5** (Max = 5)

SOURCES USED IN SCORING

1. Washington State Department of Ecology, *Toxicology Database for Use in Washington Ranking Method Scoring*, January 1992.
2. Washington State Department of Ecology, *WARM Scoring Manual*, April 1992.
3. Western Regional Climate Center, Precipitation data from the Olympia, Washington Airport, June 1948 to September 2005.
4. Thurston County Environmental Monitoring, Thurston County Courthouse West Olympia, *All data from 2009-2014*, December 2014.
5. Thurston County GeoData Center, Roads and Transportation Division, October 2013.
6. Washington State Department of Health, Drinking Water Division, Sentry Database, November 2012.
7. Washington State Department of Ecology, Water Resources Program, Water Right Tracking System (WRTS), October 2012.
8. Department of Ecology, *ERTS#607794 Lacey Market Square 1 and 2*, August 19, 2008.
9. Thurston County Environmental Health, *Initial Investigation Lacey Market Square Dry Cleaning Solvent Contamination*, October 20, 2008.
10. RP Realty Partners, LLC. Re: Dry Cleaning Solvent Releases from Howard's Cleaners located at 4224 Pacific Avenue Southeast, Lacey, Washington 98503 Letter to the Washington State Department of Ecology, August 15, 2008.
11. Waterstone Environmental, Inc., *Re: Apparent Release of PCE and TCE to Soil and Groundwater at Howard's Cleaners, Located at 4224 Pacific Avenue Southeast, Lacey, Washington Letter to Rubin Pachulski Properties 26, LLC*, December 21, 2007.
12. Washington State Department of Ecology, *Site Hazard Assessment: Howard's Cleaners TCP ID#19341958*, December 10, 2009.
13. Washington State Department of Ecology, *RE: Site Hazard Assessment Completion, Ecology Facility Site ID: 19341958*¸ January 25, 2010.
14. Washington State Department of Ecology, *RE: Early Notice Letter Regarding the Release of Hazardous Substances at Howard's Cleaners, located at 4224 Pacific Avenue SE, Lacey, Washington 98503. Facility Site Identification Number: 19341958.* February 19, 2009.
15. Washington State Department of Ecology, *ERTS# 607794*, August 19, 2008.
16. Washington State Department of Ecology, *RE: Early Notice Letter Regarding the Release of Hazardous Substances at Lacey Market Center, located at 700 Sleater-Kinney Road SE, Lacey, Washington 98503. Facility Site Identification Number: 9945327*, February 25, 2009.