SITE HAZARD ASSESSMENT
WORKSHEET 1
Summary Score Sheet

SITE INFORMATION:

Name: East Bay Redevelopment **Owner**: Port of Olympia
Address: 315 Jefferson Street NE
City: Olympia **County:** Thurston **State**: WA **Zip:** 98501
Section/Township/Range: S11/T18/R2W
TCP ID # 5785176 **Latitude:** 47.04712 **Longitude:** 122.89721
Date Scored: July 24, 2008
Site scored/ranked for the August 20, 2008 update

SITE DESCRIPTION:

The Port of Olympia East Bay Redevelopment site is located in downtown Olympia, near the southern shoreline of East Bay in Budd Inlet (See Attached Thurston County Maps). The property and surrounding areas are positioned over reclaimed mud flats, which were filled by dredge spoils in the late 1800's. Historical information suggests that the site contained a variety of industrial operations and related facilities beginning in approximately 1888. These included, but were not limited to; lumber processing operations, machine/welding/electrical shops, power plants, dry kilns, and bulk fuel storage facilities. In recent years, the site contained a warehouse and gravel parking lot, which was utilized for dry boat storage. As of July 2008, the site was vacant and all remaining structures have since been demolished.

PREVIOUS SITE INVESTIGATIONS:

2006 Phase II Environmental Assessment

In September 2006, GeoEngineers Incorporated (GeoEngineers) conducted a Phase II Environmental Assessment at the site. The purpose of the assessment was to evaluate subsurface soil and groundwater for potential contamination related to past industrial operations. Eleven soil samples and five groundwater samples were collected from 10 individual soil borings (Figure 1). The boring locations were selected to address potential areas of concern based on historical information and previous site assessments.

Utilizing field screening techniques, soil samples containing the most significant evidence of potential contamination were selected for analysis. Generally, one sample was collected from each boring and ranged in depth from 1 to 6.5 feet below ground surface (bgs). Results are summarized below in Table 1. Based on the results, it appeared that at least four localized areas of contamination were present on the site, which appeared to be consistent with historical operations.

Table 1: Soil Analytical Results

Sample ID#	Arsenic (mg/kg)	Cadmium (mg/kg)	Total cPAHs[1] (ug/kg)	TPH-Diesel (mg/kg)	TPH-Gasoline (mg/kg)
DP04	**52**	**5**	nd	**3900**	nd
DP06	nd	nd	nd	nd	**290**
DP08	nd	nd	**103**	**7300**	nd
MTCA[2] Cleanup Level	20	2	100	2,000	100

[1] *Carcinogenic Polycyclic Aromatic Hydrocarbons. Ecology Toxicity Equivalency Factor (TEQ) Methodology*
[2] *Model Toxics Control Act (MTCA) Cleanup Regulation Chapter WAC 173-340. Bold entries indicate MTCA exceedances*
mg/kg - milligrams per kilogram
ug/kg - micrograms per kilogram
nd - Analyte not detected

Five groundwater samples were submitted for chemical analysis and are summarized below in Table 2. Groundwater was observed at depths ranging from 1.5 to 5.5 feet bgs. The contaminants detected in groundwater were similar to those detected in soils and may be related to the same historical sources.

Table 2: Groundwater Analytical Results

Sample ID#	TPH-Diesel (ug/L)	PCBs (ug/L)	Pentachloro-phenol (ug/L)	Total cPAHs[1] (ug/L)
DP01-W	nd	nd	**3.3**	nd
DP04-W	**2000**	**0.13**	nd	**0.12**
MTCA[2] Cleanup Level	500	0.1	0.73	0.1

[1]Carcinogenic Polycyclic Aromatic Hydrocarbons. Ecology Toxicity Equivalency Factor (TEQ) Methodology
[2]Model Toxics Control Act (MTCA) Cleanup Regulation Chapter WAC 173-340. Bold entries indicate MTCA exceedances
nd - Analyte not detected
ug/L - micrograms per liter

2007 Remedial Investigation/Feasibility Study (RI-FS) and Cleanup Action Plan

In January and February 2007, a remedial investigation was conducted to further evaluate previously discovered contamination. Field activities consisted of advancing 10 direct-push soil borings at various locations throughout the site (See Figure 2). Six of the borings were completed as monitoring wells MW05 through MW10. A total of 20 soil samples and 6 groundwater samples were submitted for analysis. Final results (see attached Table 3 and Table 4) confirmed the presence of petroleum-range hydrocarbons, CPAHs, Pentachlorophenol, and Bis (2-Ethylexyl) phthalate at concentrations exceeding applicable MTCA cleanup levels. With the exception of the Bis (2-Ethylexyl) phthalate detection, analytical results were consistent with the 2006 Phase II Environmental Assessment.

CONCLUSION

Contamination resulting from historical operations has been confirmed in subsurface soils and groundwater. An initial remedial action plan has been submitted to Ecology as part of a proposed Agreed Order. As of July 2008, final terms of the Agreed Order are still under negotiation.

SPECIAL CONSIDERATIONS

Groundwater at the site consists of tidally influenced water which is poor in quality and not utilized for drinking or irrigation. Furthermore, all drinking water and irrigation sources are documented to be located upgradient from the site.

ROUTE SCORES:

Surface Water/Human Health: 20.6
Air/Human Health: 25.6
Groundwater/Human Health: 38.6

Surface Water/Environmental: 34.3
Air/Environmental: NS

OVERALL RANK: 2

WORKSHEET 2
Route Documentation

1. **SURFACE WATER ROUTE**
   a. List those substances to be considered for scoring: Source: 1, 2

      TPH-Diesel, Benzo[a]pyrene, TPH-Gasoline, Arsenic, Cadmium

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

      Documented presence of TPH-Diesel and Benzo[a]pyrene in excess of MTCA Method A cleanup levels in shallow subsurface soil (1-3 feet bgs).

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

      Contaminated soil

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

      Documented presence of TPH-Diesel and Benzo[a]pyrene in excess of MTCA Method A cleanup levels in shallow subsurface soil (1-3 feet bgs).

2. **AIR ROUTE**
   a. List those substances to be considered for scoring: Source: 1, 2

      TPH-Diesel, Benzo[a]anthracene, Chrysene, TPH-Gasoline, Arsenic, Cadmium

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

      Documented presence of TPH-Diesel, Chrysene, and Benzo[a]anthracene in excess of MTCA Method A cleanup levels in shallow subsurface soil (1-3 feet bgs).

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

      Contaminated soil

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

      Documented presence of Benzo[a]pyrene and TPH-Diesel in excess of MTCA Method A cleanup levels in shallow subsurface soil (1-3 feet bgs).

3. **GROUNDWATER ROUTE**
   a. List those substances to be considered for scoring: Source: 1, 2

      Pentachlorophenol, PCBs, Benzo[a]pyrene, TPH-Diesel, Bis (2-Ethylexyl) phthalate

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

      The above substances have been confirmed in groundwater and/or soil at concentrations exceeding MTCA cleanup levels.

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

      Contaminated groundwater

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

      The above substances have been confirmed in groundwater and/or soil at concentrations exceeding MTCA Method A cleanup levels.

WORKSHEET 4
Surface Water Route

1.0 SUBSTANCE CHARACTERISTICS

1.1 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	TPH-Diesel	160	4	490 rat	5	0.004	5	ND	ND	-
2	Benzo[a]pyrene	0.2	10	50 rat	10	ND	-	0.8	0.96	5
3	TPH-Gas	5	8	3306 rat	3	ND	-	1.0	.029	3

Potency Factor, ND=No Data

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

1.2 Environmental Toxicity ( ) Freshwater (X) Marine

	Substance	Acute Water Quality Criteria		Non-Human Mammalian Acute Toxicity	
		(µg/L)	Value	(mg/kg)	Value
1	TPH-Diesel	2350	2		
2	Benzo[a]pyrene	300	4		
3					

Source: 1, 2
Highest Value: 4
(Max = 10)

1.3 Substance Quantity (areal extent)

Explain Basis: Unknown, use default value = 1

Source: 1, 2
Value: 1
(Max = 10)

2.0 MIGRATION POTENTIAL

		Source	Value
2.1	**Containment:** Contaminated soil at the surface with no run-on/runoff control **Explain basis:** Documented release to shallow subsurface soils (1-3 feet bgs).	1, 2	**10** (Max = 10)
2.2	**Surface Soil Permeability:** Poorly graded fill materials (sand, gravel, silt, debris, etc)	1, 2	**1** (Max = 7)
2.3	**Total Annual Precipitation:** 50.81 inches	5	**4** (Max = 5)
2.4	**Max 2yr/24hr Precipitation:** 3.0 inches	4	**3** (Max = 5)
2.5	**Flood Plain:** between 100 and 500 year flood zone	7	**1** (Max = 2)
2.6	**Terrain Slope:** less than 2%	7	**1** (Max = 5)

3.0 TARGETS

		Source	Value
3.1	**Distance to Surface Water:** 300 feet. Located on marine shoreline	7	**10** (Max = 10)
3.2	**Population Served within 2 miles:** Total population = 0.	8, 9	**0** (Max = 75)
3.3	**Area Irrigated by surface water within 2 miles:** 0 acres.	9	**0** (Max = 30)
3.4	**Distance to Nearest Fishery Resource:** 300 feet. Located near marine shoreline	7	**12** (Max = 12)
3.5	**Distance to, and Name(s) of, Nearest Sensitive Environment(s):** 300 feet, fisheries resource	7	**12** (Max = 12)

4.0 RELEASE

Explain Basis: No documented release to shoreline sediments.	Source: 1, 2 **Value: 0** (Max = 5)

WORKSHEET 5
Air Route

1.0 SUBSTANCE CHARACTERISTICS

1.1. Introduction

1.2 Human Toxicity

	Substance	Air Standard (µg/m³)	Value	Acute Toxicity (mg/ m³)	Value	Chronic Toxicity (mg/kg/day)	Value	Carcinogenicity		Value
								WOE	PF*	
1	Benzo[a]anthracene	ND	-	ND	-	ND	-	0.8	ND	-
2	TPH-Diesel	166.5	4	ND	-	ND	-	ND	ND	-
3	Chrysene	ND	-	ND	-	ND	-	0.8	ND	-

** Potency Factor, ND=No Data*

Source: 3, 4
Highest Value: 4
(Max = 10)
Plus 2 Bonus Points? No
Final Toxicity Value: 4
(Max = 12)

1.3 Mobility (Use numbers to refer to above listed substances)

	1.3.1 Gaseous Mobility	1.3.2 Particulate Mobility		
	Vapor Pressure(s) (mmHg)	Soil Type	Erodibility	Climatic Factor
1		Poorly sorted fill: sand, silt, clay, gravel, etc.	>30-80 tons/acre/yr	<1
2	8.2E-02, Value 3			
3		Poorly sorted fill: sand, silt, clay, gravel, etc.	>30-80 tons/acre/yr	<1

Source: 3, 4
Value: 3
(Max = 4)

Source: 3, 4
Value: 1
(Max = 4)

1.4 Highest Human Health Toxicity/ Mobility Matrix Value (from Table A-7)
TPH-Diesel: Toxicity = 4, Mobility = 3, Final Value = 6
Benzo[a]anthracene: Toxicity = ND, Mobility = 1, Final Value = No Value
Chrysene: Toxicity = ND, Mobility = 1, Final Value = No Value

Final Matrix Value: 6
(Max = 24)

1.5 Environmental Toxicity/Mobility						
	Substance	**Non-human Mammalian Inhalation Toxicity (mg/m^3)**	**Acute Value**	**Mobility (mmHg)**	**Value**	**Matrix Value**
1	Benzo[a]anthracene	ND	-	particulate	1	-
2	TPH-Diesel	ND	-	8.2E-02	3	-
3	Chyrsene	ND	-	particulate	1	-

Highest Environmental Toxicity/Mobility Matrix Value (from Table A-7) = **Final Matrix Value: NS**
(Max = 24)

1.6 Substance Quantity (areal extent)	
Explain Basis: Unknown, use default value = 1	Source: 1, 2 **Value: 1** (Max = 10)

2.0 MIGRATION POTENTIAL

		Source	Value
2.1	**Containment:** Score as surface spill/discharge and no vapor collection or cover.	1, 2	**10** (Max = 10)

3.0 TARGETS

		Source	Value
3.1	**Nearest Population:** less than 1000 feet	7	**10** (Max = 10)
3.2	**Distance to [and name(s) of] nearest sensitive environment(s) [fisheries excluded]:** 300 feet, State-designated areas for protection and maintenance of aquatic life.	4, 7	**7** (Max = 7)
3.3	**Population within 0.5 miles:** $\sqrt{3190}=56.5=57$	7	**57** (Max = 75)

4.0 RELEASE

Explain Basis for scoring a release to air: No confirmed release to air	Source: 1, 2 **Value: 0** (Max = 5)

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	Benzo[a]pyrene	0.2	10	50 rat	10	ND	-	0.8	0.96	5
2	PCBs	0.5	10	1315 rat	3	ND	-	0.8	0.616	5
3	Pentachlorophenol	0.1	10	ND	-	0.03	1	0.8	0.096	3
4	TPH-Diesel	160	4	490 (rat)	5	0.004	3	ND	ND	-
5	Bis (2-Ethylexyl) phthalate	ND	-	30600 (rat)	1	0.02	1	0.8	0.011	3

* *Potency Factor, ND=No Data*

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

1.2 Mobility (use numbers to refer to above listed substances)

Cations/Anions [Coefficient of Aqueous Migration (K)] OR	Solubility (mg/L)
1=	1= Benzo[a]pyrene, 1.2E-03, Value 0
2=	2= PCBs, 3.1E-02, Value 0
3=	3= Pentachlorophenol, 1.4E+01, Value 1
4=	4= TPH-Diesel, 3.0E+01, Value 1
	5= Bis (2-Ethylexyl) phthalate, 4.0E-01. Value 0

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

1.3 Substance Quantity (volume):

Explain basis: Unknown, use default value = 1

Source: 1, 2
Value: 1
(Max=10)

MIGRATION POTENTIAL

		Source	Value
2.1	**Containment (explain basis):** Spills to soil, no cover or liner	1, 2	**10** (Max = 10)
2.2	**Net precipitation:** Nov-Apr (inches): 38.54" total precipitation, 11.74" evapotranspiration rate, 38.54-11.74 = 26.80 net precip.	5, 6	**3** (Max = 5)
2.3	**Subsurface hydraulic conductivity:** Poorly sorted fill material	1, 2, 7	**4** (Max = 4)
2.4	**Vertical depth to groundwater:** 1.5-5 feet bgs (Obs. Release = 0 feet)	1, 2	**8** (Max = 8)

2.0 TARGETS

		Source	Value
3.1	**Groundwater usage:** Groundwater not useable, poor quality	8, 9	**1** (Max = 10)
3.2	**Distance to nearest drinking water well:** Not applicable, all wells upgradient	7	**0** (Max = 5)
3.3	**Population served within 2 miles:** Population = 0	8, 9	**0** (Max = 100)
3.4	**Area irrigated by (groundwater) wells within 2 miles:** All wells located upgradient	9	**0** (Max = 50)

3.0 RELEASE

	Source	Value
Explain basis for scoring a release to groundwater: Documented release	1, 2	**5** (Max = 5)

SOURCES USED IN SCORING

1. GeoEngineers, Inc, *Phase II Environmental Site Assessment Report, 1022 Marine Drive NE, Olympia, Washington,* November 6, 2006.
2. GeoEngineers, Inc, *Remedial Investigation/Feasibility Study (RI-FS) and Cleanup Action Plan, Port of Olympia East Bay Redevelopment,* April 24, 2007.
3. Washington State Department of Ecology, Toxicology Database for Use in Washington Ranking Method Scoring, January 1992.
4. Washington State Department of Ecology, WARM Scoring Manual, April 1992.
5. Western Regional Climate Center, Precipitation data from the Olympia, Washington Airport, June 1948 to September 2005.
6. Table 16-Estimated Evapotranspiration, E.M. 2462, p42, for Thurston County Airport.
7. Thurston County Geodata Center, Roads and Transportation Division, June 2008.
8. Washington State Department of Health, Drinking Water Division, Sentry Database, October 2007.
9. Washington State Department of Ecology, Water Resources Program, Water Right Tracking System (WRTS), October 2007.