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Two Union Square
601 Union Street, Suite 600
Seattle, WA 98101
tel: 206.292.2078 fax: 206.682.7867

Memorandum

To: Ron Timm, Washington State Department of Ecology

Copies: Carol Wiseman, Weyerhaeuser
Sandy Forman, M.A.P. #2, LLC

From: Lynn Grochala, Floyd|Snider

Date: October 20, 2017

Project No: Weyer-Mill E

Re: **Pipe Exploration Summary for Storm Drain Associated with Outfall LLO-07**

In February and March 2017, Floyd|Snider performed fieldwork at the Former Mill E/Koppers Facility in Everett, Washington (the Site), at the request of Weyerhaeuser, to investigate Outfall LLO-07 and its associated conveyance piping. Refer to Figure 1 for the location of the Site. Floyd|Snider, along with their subcontractor Applied Professional Services (APS), first investigated the pipe at Outfall LLO-07 in February with a video camera mounted on a crawler device, and recorded a video of the interior of the pipe to about 33 feet in a northwesterly direction from the outfall. The crawler could not proceed farther because the pipe was obstructed by large, woody debris. In early March, Floyd|Snider and APS further investigated the pipe using sonde technology. They were able to trace the pipe 290 feet from where it discharges at Outfall LLO-07, at which point there was an obstruction in the pipe that could not be bypassed with the sonde (refer to Figure 2). Floyd|Snider was able to trace approximately 90 percent of the length of the pipe from Outfall LLO-07 in a northwesterly direction across the Site.

The Washington State Department of Ecology (Ecology) subsequently requested in a verbal communication on August 9, 2017, that Weyerhaeuser attempt to locate the remainder of the pipe to the edge of the property and Site boundary. Therefore, in September 2017, Floyd|Snider, along with staff from Pacific Topsoil, performed two additional field events to continue the investigation of Outfall LLO-07 and its associated conveyance piping.

The average water table in the area of the piping is between 5 and 6 feet below ground surface (bgs), but is tidally influenced by the Snohomish River. Because of this, both events were completed at low tide, with subsurface exploration targeted when the tide was below 3 feet mean lower low water (MLLW). Photographic documentation of both exploration events is included in Attachment 1 and the findings are depicted on Figure 3.

On September 5, Floyd|Snider requested that APS complete additional exploration via "potholing," using a vacuum extraction truck and attached flexible hosing to penetrate into the subsurface and confirm the remainder of the storm drain piping associated with Outfall LLO-07. APS first potholed at the last verified location of the stormwater pipe from the March 2017 field investigation, which was approximately 290 feet northeast of Outfall LLO-07 and 40 feet southwest of the Site boundary. The pipe at this location was exposed and observed to be intact and intersected with a buried structure just beyond the original point of obstruction where the sonde probe could no longer advance in March. The unknown structure was further uncovered with the vacuum truck to reveal a square wooden "junction box" approximately 2 feet wide on each side, with the top of the box observed at 4 feet bgs. The structure did not have a lid and was densely filled with dirt and woody debris (refer to Photograph 1 of Attachment 1). The 12-inch-diameter concrete outlet pipe (outlet to outfall) entered the box from the eastern face with the top of the pipe approximately 2 feet below the top of the box (6 feet bgs). An 8-inch-diameter concrete inlet pipe was uncovered entering the box on the western edge, directly across from the 12-inch-diameter concrete outlet pipe at approximately the same invert elevation. The vacuum truck was used to pothole west of the junction box toward the property line in an attempt to continue tracing the pipe. The pipe was not located during multiple pothole attempts, so the inlet pipe was exposed on the western edge just outside the junction box. Further exploration showed that the 8-inch-diameter pipe traveled west away from the junction box, but turned southwest approximately 2 feet west of the box via several conjoined bell joints that formed an approximate 130 degree curve (refer to Photograph 2 of Attachment 1). An effort was made to pothole where the 8-inch-diameter concrete pipe presumably would have reached the property line, but was unsuccessful. At this time, the tide was coming in, making further exploration difficult; therefore, the decision was made to cease exploration for the day. Soil that was removed from each location was used to backfill the same location it was removed from.

On September 22, Floyd|Snider performed a second field exploration event to further investigate the junction box and 8-inch-diameter concrete pipe using sonde technology provided by Floyd|Snider's subcontractor Innovative Vacuum Services, Inc. (Innovac) and a portable vacuum extraction unit from ESN Northwest. The junction box was uncovered and hand tools were used to fully clear the inside of the box to better access the pipes. Starting near the top of the pipes, angular rock approximately 2 inches in diameter was encountered and appeared to fill the bottom of the box and near pipe inlets and outlet (refer to Photograph 3 of Attachment 1). The rock was removed down to the pipe inverts and as much as possible from the pipe interiors. During this work, a second 8-inch-diameter concrete pipe oriented to the northwest was discovered inside of a cutout in the north side of the box. All three uncovered pipes had approximately the same invert elevation (refer to Photographs 4 and 5 of Attachment 1). There was no evidence of a pipe or cutout on the south side of the box.

The 8-inch-diameter pipe on the west side of the junction box (assumed stormwater pipe) was traced using a sonde probe approximately 45 feet before reaching an impassable obstruction. This obstruction occurred just before the property line. The pipe was then potholed at this location and confirmed to be intact with no visible signs of damage or obstruction (refer to

Photograph 6 of Attachment 1). This was the farthest this pipe could be potholed without crossing the property line or undermining the property line fence. Based upon the visual observation of the west 8-inch-diameter pipe, Floyd|Snider believes there is sufficient evidence to reasonably infer that this pipe crosses the property line intact and drains, or previously drained, an unknown area away from and off of the property. The origin of the pipe remains unknown.

The 8-inch-diameter pipe observed entering the junction box to the north was traced from the junction box using a sonde probe. The sonde verified that the pipe ran straight in a north/northwest direction toward the barrier wall and cap; however, the sonde hit an obstruction at approximately 40 feet. The pipe was then potholed at this location and confirmed to be intact with no visible signs of damage or other indication of the unknown blockage. It was decided to discontinue further potholing along the pipe alignment to the north due to the concern of moving closer to the barrier wall and asphalt cap.

During the investigation as the tide was going out, the water level outside of the junction box was observed to be at a higher elevation than inside the box and the water inside the box was observed exiting the box via the 12-inch-diameter outlet pipe. The work was completed before high tide, so it was not clear if the water was entering the box from the outlet pipe (tide flow) only or if the groundwater level was rising from the bottom. The bottom of the box was full of 2-inch-diameter angular rock and it is not clear if there is a solid bottom or not.

Floyd|Snider completed subsequent review of prior Site documents in an attempt to identify the source of the 8-inch-diameter pipe that was identified on the north side of the junction box. As-Built drawings from the 1999 Construction Completion Report for the former Mill E/Koppers Site Remediation show a pressure sanitary sewer pipe that appears to line up (within a few feet) with the 8-inch-diameter concrete pipe. The sanitary sewer line was documented as a 4-inch-diameter steel pipe that was cut and capped during the remediation and construction of the barrier wall. A metal detector was subsequently used in an attempt to locate the 4-inch-diameter steel pipe where it was cut and capped, but was not detected. Based upon these observations, Floyd|Snider believes it is reasonable to infer that the 4-inch-diameter sanitary sewer line transitioned to the 8-inch-diameter concrete line prior to entry into the junction box, and therefore this pipe was filled with select fill, cut, and capped at the barrier wall. The As-Built drawings do not show the junction box, but show that the sanitary sewer pipe (identified as 6 inches +/- with construction material not known) crosses the property and terminates at a sanitary sewer manhole (SSMH-3) off-the property (refer to Drawing No. 1 included as Attachment 2). The plans do not show a discharge location for the sanitary sewer; therefore, it is also reasonable to infer that the utility drawings were not correct and that the sanitary sewer terminated at the junction box and subsequently discharged out Outfall LLO-07.

To address the unknown off-site source of arsenic that is discharging via Outfall LLO-07 and potentially acting as an on-going source of arsenic to the subsurface of the Site at the junction box, Weyerhaeuser and Pacific Topsoil propose to cap or plug the inlet and outlet pipes from

within the junction box and to subsequently fill the wooden junction box with concrete. Sealing the box and associated pipes would eliminate the flow of river water from the Snohomish River into and out of the junction box via the outfall and piping, would eliminate the outfall as a pathway for contamination to the river via discharge out LLO-07, and would prevent off-site contamination from impacting Site soils.

LIST ATTACHMENTS

Figure 1	Site Location
Figure 2	Stormwater Features
Figure 3	LLO-07 Outfall Pipe Survey Details
Attachment 1	Photographic Documentation
Attachment 2	Drawing No. 1: Former Mill E/Koppers Site Remediation Site Plan

Figures

Legend

- Site Boundary
- Former Everett Smelter Facility Boundary
- Everett Smelter Lowland Area
- Everett Smelter Uplands Area

Notes:
· Orthoimage provided by nearmap, 8/20/2016.

0 400 800 1,600
Scale in Feet

N

Snohomish River

Everett Smelter Upland Area

Everett Smelter Lowland Area

Former Mill E/Koppers Site

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Former Mill E/Koppers Site
Everett, Washington

Figure 1
Site Location

I:\GIS\Projects\WEYER_MILL_E\MXD\Figure 1 Site Location.mxd
3/14/2017

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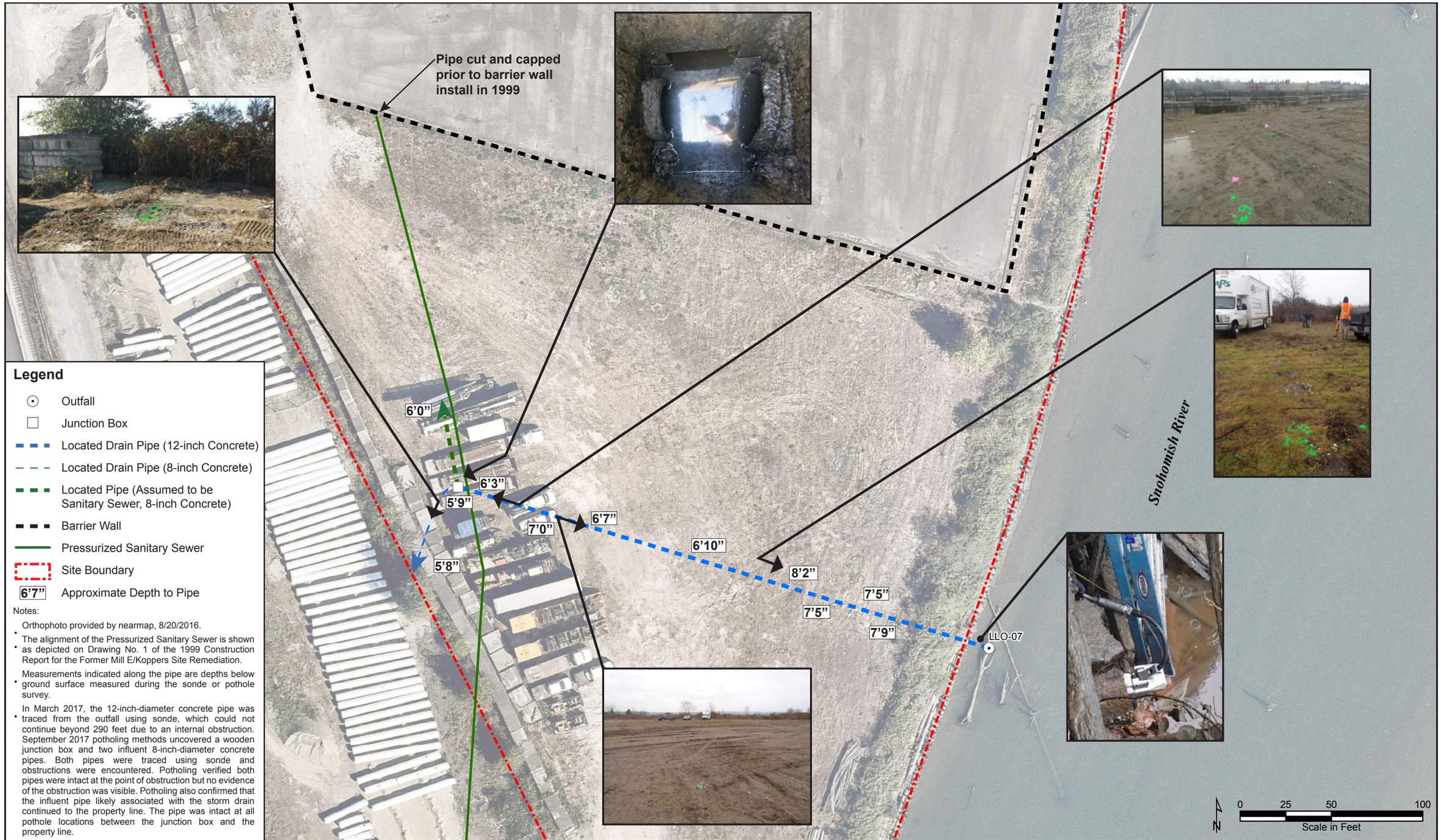
Former Mill E/Koppers Site
Everett, Washington

Figure 2
Stormwater Features

I:\GIS\Projects\WEYER_MILL_E\MXD\Pothole Exploration Summary Memo\Figure 2 Stormwater Features Portrait.mxd
10/20/2017



Legend

- Outfall
- Junction Box
- Located Drain Pipe (12-inch Concrete)
- Located Drain Pipe (8-inch Concrete)
- Located Pipe (Assumed to be Sanitary Sewer, 8-inch Concrete)
- Barrier Wall
- Pressurized Sanitary Sewer
- Site Boundary
- 6'7" Approximate Depth to Pipe

Notes:

- Orthophoto provided by nearmap, 8/20/2016.
- The alignment of the Pressurized Sanitary Sewer is shown as depicted on Drawing No. 1 of the 1999 Construction Report for the Former Mill E/Koppers Site Remediation.
- Measurements indicated along the pipe are depths below ground surface measured during the sonde or pothole survey.
- In March 2017, the 12-inch-diameter concrete pipe was traced from the outfall using sonde, which could not continue beyond 290 feet due to an internal obstruction. September 2017 potholing methods uncovered a wooden junction box and two influent 8-inch-diameter concrete pipes. Both pipes were traced using sonde and obstructions were encountered. Potholing verified both pipes were intact at the point of obstruction but no evidence of the obstruction was visible. Potholing also confirmed that the influent pipe likely associated with the storm drain continued to the property line. The pipe was intact at all pothole locations between the junction box and the property line.

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Former Mill E/Koppers Site
Everett, Washington

Figure 3
LLO-07 Outfall Pipe Survey Details

I:\GIS\Projects\WEYER_MILL_E\AI\09-22 Pipe Locate\09-22 Pipe Locate.ai
10/19/2017

Attachment 1
Photographic Documentation

Photograph 1. The wooden junction box viewed looking northwest, in line with the 12-inch-diameter concrete outlet pipe (September 5, 2017).

Photograph 2. The 8-inch-diameter concrete inlet pipe outside (west) of the junction box curving west to southwest via conjoined bell joints (September 5, 2017).

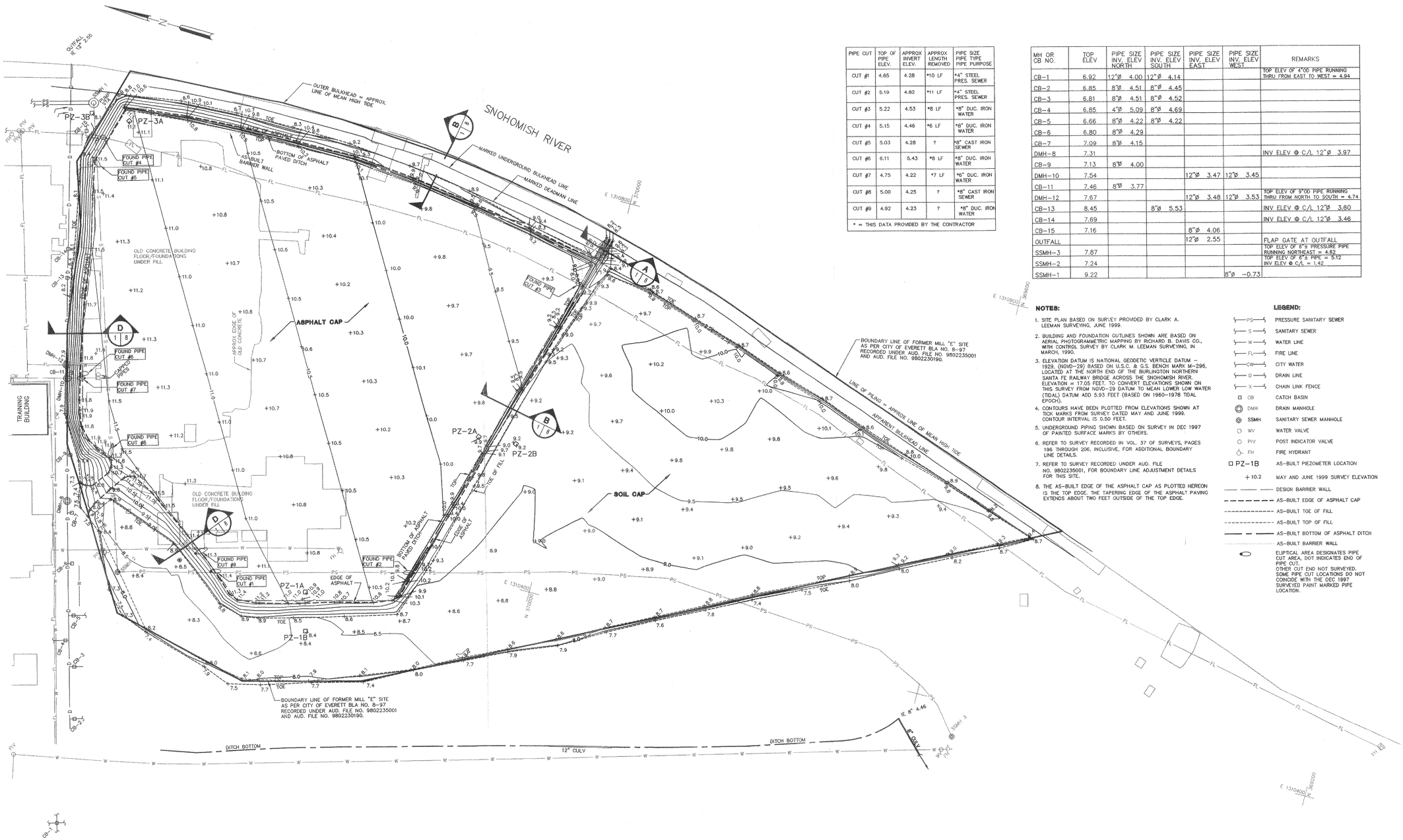
Photograph 3. Clearing out mud and rock from the junction box. Photograph taken during ebb tide, causing water (river water) to flow into the box from the inlet pipes and out of the box through the outlet pipe (September 22, 2017).

Photograph 4. Inside view of the junction box. The box interior includes the 12-inch-diameter concrete outlet pipe to Outfall LLO-07 (bottom), the 8-inch-diameter concrete inlet pipe traveling north from the box toward the barrier wall and asphalt cap (right), and the 8-inch-diameter concrete inlet pipe traveling west toward the property line (top) (September 22, 2017).

Photograph 5. View of the 8-inch-diameter concrete pipe on the north side of the junction box. A buildup of rock and mud was visible inside all three pipes (September 22, 2017).

Photograph 6. View of the exposed 8-inch-diameter pipe on the west side of the junction box at the property line (September 22, 2017)

Attachment 2
Drawing No. 1: Former Mill E/Koppers Site Remediation Site Plan



PIPE CUT	TOP OF PIPE ELEV.	APPROX INVERT ELEV.	APPROX LENGTH REMOVED	PIPE SIZE PIPE TYPE PIPE PURPOSE
CUT #1	4.65	4.28	*10 LF	*4" STEEL PRES. SEWER
CUT #2	5.19	4.82	*11 LF	*4" STEEL PRES. SEWER
CUT #3	5.22	4.53	*8 LF	*8" DUC. IRON WATER
CUT #4	5.15	4.46	*6 LF	*6" DUC. IRON WATER
CUT #5	5.03	4.28	?	*8" CAST IRON SEWER
CUT #6	6.11	5.43	*8 LF	*8" DUC. IRON WATER
CUT #7	4.75	4.22	*7 LF	*6" DUC. IRON WATER
CUT #8	5.00	4.25	?	*8" CAST IRON SEWER
CUT #9	4.92	4.23	?	*8" DUC. IRON WATER

* = THIS DATA PROVIDED BY THE CONTRACTOR

MH OR CB NO.	TOP ELEV	PIPE SIZE INV. ELEV NORTH	PIPE SIZE INV. ELEV SOUTH	PIPE SIZE INV. ELEV EAST	PIPE SIZE INV. ELEV WEST	REMARKS
CB-1	6.92	12"Ø 4.00	12"Ø 4.14			TOP ELEV OF 4"OD PIPE RUNNING THRU FROM EAST TO WEST = 4.94
CB-2	6.85	8"Ø 4.51	8"Ø 4.45			
CB-3	6.81	8"Ø 4.51	8"Ø 4.52			
CB-4	6.85	4"Ø 5.09	8"Ø 4.69			
CB-5	6.66	8"Ø 4.22	8"Ø 4.22			
CB-6	6.80	8"Ø 4.29				
CB-7	7.09	8"Ø 4.15				
DMH-8	7.31					INV ELEV @ C/L 12"Ø 3.97
CB-9	7.13	8"Ø 4.00				
DMH-10	7.54			12"Ø 3.47	12"Ø 3.45	
CB-11	7.46	8"Ø 3.77				
DMH-12	7.67			12"Ø 3.48	12"Ø 3.53	TOP ELEV OF 9"OD PIPE RUNNING THRU FROM NORTH TO SOUTH = 4.74
CB-13	8.45		8"Ø 5.53			INV ELEV @ C/L 12"Ø 3.60
CB-14	7.69					INV ELEV @ C/L 12"Ø 3.46
CB-15	7.16			8"Ø 4.06		
OUTFALL				12"Ø 2.55		FLAP GATE AT OUTFALL
SSMH-3	7.87					TOP ELEV OF 8"ø PRESSURE PIPE RUNNING NORTHEAST = 4.62
SSMH-2	7.24					TOP ELEV OF 6"ø PIPE = 5.12
SSMH-1	9.22				8"Ø -0.73	INV ELEV @ C/L = 1.42

NOTES:

1. SITE PLAN BASED ON SURVEY PROVIDED BY CLARK A. LEEMAN SURVEYING, JUNE 1999.
2. BUILDING AND FOUNDATION OUTLINES SHOWN ARE BASED ON AERIAL PHOTOGRAMMETRIC MAPPING BY RICHARD B. DAVIS CO., WITH CONTROL SURVEY BY CLARK M. LEEMAN SURVEYING, IN MARCH, 1990.
3. ELEVATION DATUM IS NATIONAL GEODETIC VERTICLE DATUM – 1929, (NGVD-29) BASED ON U.S.C. & G.S. BENCH MARK M-296, LOCATED AT THE NORTH END OF THE BURLINGTON NORTHERN SANTA FE RAILWAY BRIDGE ACROSS THE SNOHOMISH RIVER. ELEVATION = 17.05 FEET. TO CONVERT ELEVATIONS SHOWN ON THIS SURVEY FROM NGVD-29 DATUM TO MEAN LOWER LOW WATER (TIDAL) DATUM ADD 5.93 FEET (BASED ON 1960–1978 TIDAL EPOCH).
4. CONTOURS HAVE BEEN PLOTTED FROM ELEVATIONS SHOWN AT TICK MARKS FROM SURVEY DATED MAY AND JUNE 1999. CONTOUR INTERVAL IS 0.50 FEET.
5. UNDERGROUND PIPING SHOWN BASED ON SURVEY IN DEC 1997 OF PAINTED SURFACE MARKS BY OTHERS.
6. REFER TO SURVEY RECORDED IN VOL. 37 OF SURVEYS, PAGES 196 THROUGH 206, INCLUSIVE, FOR ADDITIONAL BOUNDARY LINE DETAILS.
7. REFER TO SURVEY RECORDED UNDER AUD. FILE NO. 9802235001, FOR BOUNDARY LINE ADJUSTMENT DETAILS FOR THIS SITE.
8. THE AS-BUILT EDGE OF THE ASPHALT CAP AS PLOTTED HEREON IS THE TOP EDGE. THE TAPERING EDGE OF THE ASPHALT PAVING EXTENDS ABOUT TWO FEET OUTSIDE OF THE TOP EDGE.

LEGEND:

- PS — PRESSURE SANITARY SEWER
- S — SANITARY SEWER
- W — WATER LINE
- FL — FIRE LINE
- CW — CITY WATER
- D — DRAIN LINE
- X — CHAIN LINK FENCE
- CB — CATCH BASIN
- DMH — DRAIN MANHOLE
- SSMH — SANITARY SEWER MANHOLE
- WV — WATER VALVE
- PIV — POST INDICATOR VALVE
- FH — FIRE HYDRANT
- PZ-1B — AS-BUILT PIEZOMETER LOCATION
- +10.2 — MAY AND JUNE 1999 SURVEY ELEVATION
- DESIGN BARRIER WALL
- AS-BUILT EDGE OF ASPHALT CAP
- AS-BUILT TOE OF FILL
- AS-BUILT TOP OF FILL
- AS-BUILT BOTTOM OF ASPHALT DITCH
- AS-BUILT BARRIER WALL
- ELIPTICAL AREA DESIGNATES PIPE CUT AREA, DOT INDICATES END OF PIPE CUT. OTHER CUT END NOT SURVEYED, SOME PIPE CUT LOCATIONS DO NOT COINCIDE WITH THE DEC 1997 SURVEYED PAINT MARKED PIPE LOCATION.

0 50 100
SCALE (ft)

TOPOGRAPHY PREPARED BY PHOTOGRAMMETRIC METHOD BY: CLARK M. LEEMAN LAND SURVEYING.

SOURCE: WRS INFRASTRUCTURE & ENVIRONMENT, INC.

KENT W. WIKEN
STATE OF WASHINGTON
34524
REGISTERED
PROFESSIONAL ENGINEER
9-1-99
EXPIRES 12/5/99

REV	DATE	DESCRIPTION	DWN BY	DES BY	CHK BY	APP BY
0	9/99	AS BUILT RECORDS	MLP	KWW	KWW	BJD

DATE OF ISSUE 9/99 — DWN BY MLP — DES BY KWW — CHK BY KWW — APP BY BJD

EMCON

WEYERHAEUSER COMPANY
WEYERHAEUSER EVERETT EAST SITE
EVERETT, WASHINGTON

FORMER MILL "E" / KOPPERS SITE REMEDIATION
SITE PLAN

DRAWING NO. 1
PROJECT NO. 793059