



MEMORANDUM

Project No.: 080205

May 4, 2009

To: Bill Lum, Washington State Department of Ecology

cc: Suzanne Dudziak, LHG, Greylock Consulting, LLC
Kevin Dragon, Port of Olympia
Joanne Snarski, Port of Olympia

From: Tyson D. Carlson, LHG
Senior Project Hydrogeologist

Doug Hillman, LHG
Principal Hydrogeologist

Re: **Artesian Well Decommissioning Work Plan**
Port of Olympia – East Bay Redevelopment

This memorandum presents the requirements, approach, and methodology for decommissioning artesian wells located near the shoreline of Budd Inlet on property owned by the Port of Olympia. The wells are located on a collection of parcels known as the East Bay Redevelopment Project. The 13-acre site is slated to be redeveloped to include public facilities, infrastructure, and private mixed uses to provide a waterfront urban center. The artesian wells are relics from past land uses, and prior to redevelopment, will be properly decommissioned to protect the water resources of the area.

Potential artesian wells were identified in historical documents of the area. The artesian wellheads were apparently covered with fill during historical grading activities and the exact wellhead locations were unknown prior to this work. To locate the wellheads, a geophysical survey was conducted in February 2009 (Duoos, 2009). These locations were then field verified on April 7, 2009 by Greylock Consulting consistent with the Excavation Plan for Potential Artesian Wells at the East Bay Site (Greylock Consulting, 2009).

The purpose of this memorandum is to detail the decommissioning procedure specific to each artesian well. Following approval from Ecology, this document will be used as a specification to facilitate selection of a licensed driller to complete the work described. To date, one artesian well (AW-1) has been field verified (including casing diameter, total depth, static head, and flow rate), two locations were confirmed not to be wells (P-1 and P-2), and one (AW-2) is pending confirmation. AW-2 is reportedly located in a below-grade concrete vault currently inundated with water. Efforts are underway to gain access to inspect the location.

Attachment A illustrates the location of each well on the East Bay redevelopment site. Select pictures of the wellheads are included as Attachment B. Attachment C provides bid sheets to facilitate selection of a licensed drilling contractor to complete the well decommissioning.

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Current Site Conditions

The following sections describe pertinent site conditions and construction information for each known wellhead.

Artesian Well AW-1

The area surrounding the well is relatively flat, allowing access of a drill rig with no ground improvements required. General ground surface cover is unimproved gravelly soil. No overhead obstructions are present. The top of casing is currently exposed in an 18-inch-diameter plastic culvert, approximately 2 feet above ground surface. Other relevant construction characteristics of AW-1 include:

- Total well depth is 83.6 feet (below ground surface);
- Static head is 7.44 feet above ground surface (measured on April 4/7/09);
- 3-inch-diameter steel casing;
- Steady state flow rate of approximately 20 gallons per minute (gpm);
- Unknown screen size and length; and
- No surface seal was observed.

Well AW-1 is currently fitted with an elbow and valve to control flow. The original well construction log is not available. Note that fluctuation in the static water level should be expected due to seasonal fluctuations.

Artesian Well AW-2

AW-2 is located beneath the bottom of a recessed railroad bay which currently contains several inches of standing water. Port personnel have indicated that the wellhead is either located in a vault, or buried in fill. Port personnel reported construction characteristics of AW-2 to include:

- Total well depth is approximately 60 feet (below ground surface);
- Unknown static head elevation;
- 4-inch-diameter steel casing;
- Reported flow rate of 20 to 30 gpm;
- Unknown screen size and length;

No construction well log is available.

Prior to decommissioning AW-2, the Port will remove the railroad tracks and ties to expose the wellhead for field confirmation of construction characteristics and measurement of static head pressure. The site will also be improved to allow direct access to the wellhead with, at a minimum, a limited access drilling rig.

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Pertinent Regulations

When a well is deemed unusable, abandoned, damaged, or use has been permanently discontinued, it must be formally decommissioned. Applicable regulations include:

- The Washington State Department of Ecology's (Ecology) Minimum Standards for Construction and Maintenance of Wells, Chapter 173-160 WAC. Standards for decommissioning a water well are described in WAC 173-160-381. In addition, WAC 173-160-271 describes the standards for surface sealing a driven well.
- Chapter 173-162 WAC establishes procedures for the examination, licensing and regulation of well contractors and operators.

In addition, the East Bay site is undergoing environmental cleanup under an Agreed Order with Ecology and is subject to worker health and safety considerations. Environmental characterization documentation will be made available to the contractor. It will be the contractor's responsibility to provide a health and safety plan, detailing measures taken to minimize potential exposure, accidents, and physical injuries that may occur during daily activities and adverse conditions. Contingency arrangements should also be made for emergency situations. At a minimum, Level D personal protective equipment (PPE) will be required for all workers on site.

Well Decommissioning Procedure

Based on observations made during the field verification and requirements of Chapter 173-160 WAC, the driller will be required to use the following decommissioning procedure of AW-1:

1. The selected driller must notify Ecology at least seventy-two hours before starting work.
2. The static head shall be measured to confirm the April 2009 measurement.
3. AW-1 shall be overdrilled using an auger with a minimum inside diameter of 6 inches. The auger should be advanced to a depth of one foot beyond the bottom of the well.
4. To overcome artesian heads and prevent excessive groundwater discharge, a minimum auger height of one foot above the static head level shall be maintained at all times. Alternative methods may be proposed by the driller, pending approval by the Port.
5. The 3-inch diameter well casing will be removed from the borehole. The contractor must verify that the entire well string has been removed and the casing did not break. The contractor is required to remove the steel casing from the site.
6. All soil cuttings from overdrilling and groundwater discharge from the well must be contained. All equipment (e.g. auger) that comes in contact with site soils must be decontaminated at the start and completion of this work. Decontamination water must

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also be contained. The driller shall place containment tanks and/or drums at a location on site designated by a Port of Olympia representative.

7. The borehole shall be decommissioned by pressure grouting with neat cement or weighted high solids bentonite slurry from the bottom of the well bore to land surface via a tremie tube.
8. Upon completion, the driller shall complete and submit a well decommissioning report to Ecology within 30 days, per WAC 173-160-141. A copy shall also be submitted to the Port of Olympia.

Following field confirmation of construction characteristics, an analogous procedure will be specified for the decommissioning of AW-2.

References

Duoss, Philip H., 2009. Geophysical Investigation, Port of Olympia East Bay Artesian Well Survey. Prepared for Greylock Consulting LLC. February, 2009.

Greylock Consulting, LLC, 2009. Excavation Plan for Potential Artesian Wells at the East Bay Site. Prepared for the Port of Olympia. February 27, 2009.

Attachments

Attachment A – Artesian Well Location Map (Greylock Consulting)

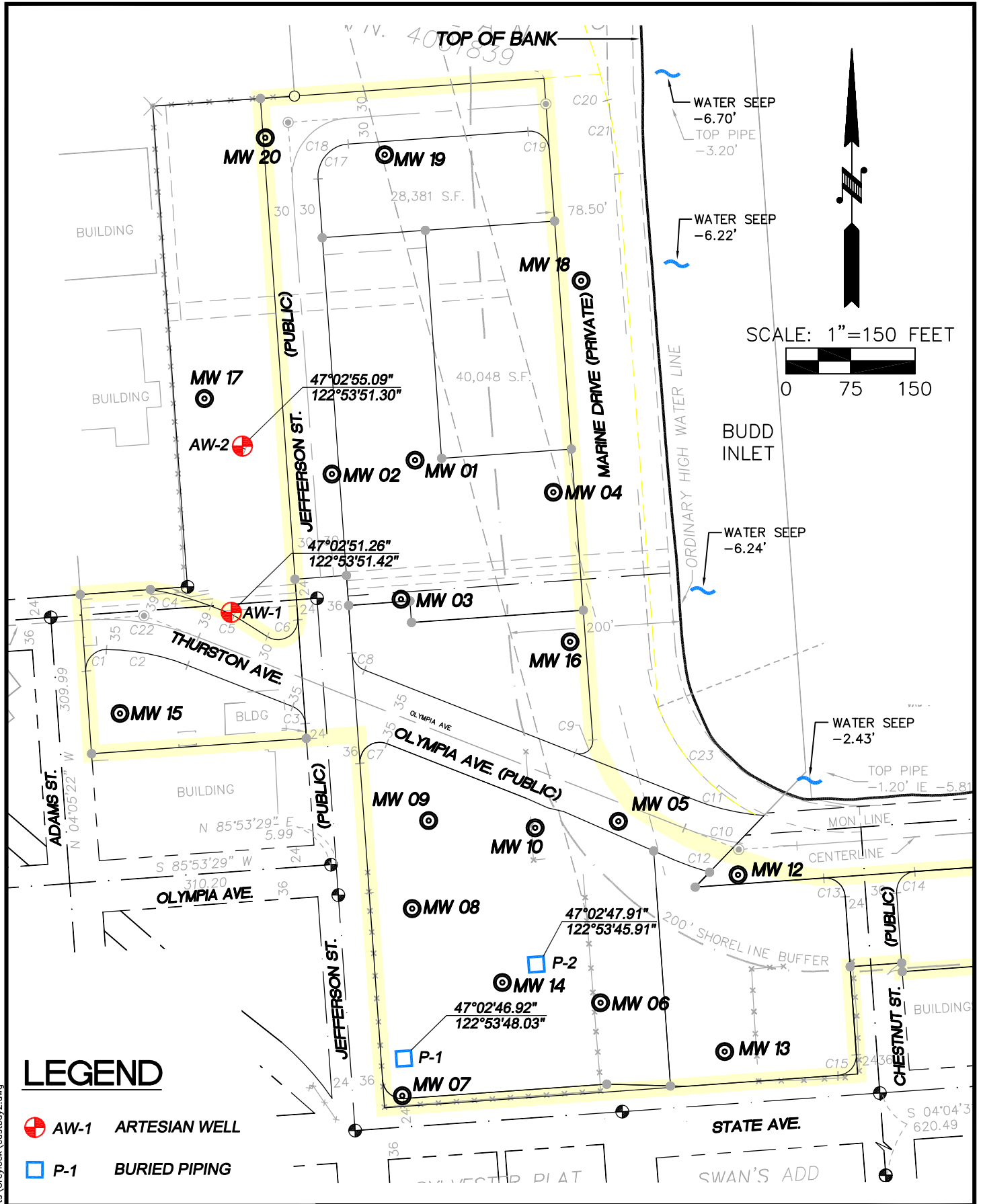
Attachment B – Pictures of AW-1 (Greylock Consulting)

Attachment C – AW-1 and AW-2 Bid Sheets

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ATTACHMENT A

Artesian Well Location Map (Greylock Consulting)



CPS April 22, 2009 - C:\clients\Greylock\eastbay2.dwg



P.O. Box 23254
Federal Way, WA 98093
Office: (253) 941-0654
greylockllc@comcast.net

GREYLOCK CONSULTING LLC
Water Resources & Environmental Services

TITLE:

**FIGURE 1
ARTESIAN WELL FINDINGS**

East Bay Site, Port of Olympia
Modified from Skillings Connolly July, 2008

DRAWN BY:
CPS

DATE:
05/01/09

SHEET NO:
1

ATTACHMENT B

**Pictures of AW-1
(Greylock Consulting)**

Figure B.1 – AW-1 at time of discovery at bottom of test pit.



Figure B.2 – Current wellhead condition of AW-1



ATTACHMENT C

AW-1 and AW-2 Bid Sheets

Attachment C - AW-1 Bid Sheet

Artesian Well Decommissioning, Port of Olympia

Item No.	Estimated Quantity	Item with Unit Priced Bid	Unit Price	Item Total
1	1 (Lump sum)	Mobilization and Demobilization, including drill rig and decontamination equipment	Lump sum	
2	85 (feet)	Overdrill borehole to 85 feet below ground surface and remove original casing, labor and materials, including soil and groundwater containment drums	Per foot	
3	85 (Feet)	Decommission borehole with pressure grout or bentonite slurry	Per foot	
4	1 (Lump sum)	Ecology notification and reporting	Lump sum	
5	4 (Hours)	Standby rate	Per hour	

SUBTOTAL OF ITEMS ABOVE

SALES TAX @

TOTAL

Attachment C - AW-2 Bid Sheet

Artesian Well Decommissioning, Port of Olympia

Item No.	Estimated Quantity	Item with Unit Priced Bid	Unit Price	Item Total
1	1 (Lump sum)	Mobilization and Demobilization, including drill rig and decontamination equipment	Lump sum	
2	61 (feet)	Overdrill borehole to 61 feet below ground surface and remove original casing, labor and materials, including soil and groundwater containment drums	Per foot	
3	61 (Feet)	Decommission borehole with pressure grout or bentonite slurry	Per foot	
4	1 (Lump sum)	Ecology notification and reporting	Lump sum	
5	4 (Hours)	Standby rate	Per hour	

SUBTOTAL OF ITEMS ABOVE

SALES TAX @

TOTAL
