DALTON OLMSTED FUGLEVAND

To: Steve Teel, Department of Ecology

From: Tasya Gray, Taylor Way and Alexander Avenue Fill Area (TWAAFA) Agreed Order Potentially Liable Parties Group Project Coordinator

Date: October 11, 2021

Subject: Revised Deep Well Summary Approach on Burlington, Clean Care and Parcel A.

As requested, this memo summarizes the approach discussed during the September 23rd conference call associated with the proposed installation of deep temporary and permanent wells on the Burlington, Clean Care and Parcel A properties as part of the TWAAFA Site. It has been updated to reflect comments received via email from Ecology on October 6, 2021.

The scope of work will follow the Final Data Gaps Work Plan (July 2020), with further refinements and clarifications based on subsequent discussions, including the above conference call, as summarized below:

General Drilling Approach

- Borings are to be advanced with a Sonic Rig. This method advances casing during drilling by direct-drive, with very low risk of carrying-down contamination when compared to other methods, such as hollow-stemmed auger.
- The driller (Cascade) is scheduled for 5 days during the week of October 11th. The current next scheduling opportunity is in late November, or December.
- Deep Well Locations - Deep wells TWA-4, 9 & 8 are planned for the original locations proposed in Figure 51. Proposed well TWA-7 location is moved ~60' to the east due to overhead power.
- We are prioritizing the drilling/well-installation of TWA-8 and TWA-9 during that October week in the following manner:
    - Drilling full-depth to 60'. Following multi-depth groundwater sampling, casing to be left in the ground, while rig moves to next location, pending lab analysis of groundwater samples.
    - Quick (1-day) turnaround for VOCs to allow discussion of well screen placement.
    - Rig moves back to casing location for well installation.
- Conductor casing set in first silt unit, expected 10-15' below ground surface (also as described for each location below). Silt unit greater than 2' thick will considered significant enough for lower conductor casing installation and soil sampling.

Conductor casing Procedure:

For isolating the shallow aquifer at the upper silt unit and isolating potential deeper silt unit (for all deep wells).

1. Advancing a 8-inch (or larger) diameter core-barrel with 8-inch diameter casing into the Silt Unit at 10-15' below ground surface. Casing shall be advanced and set at least 1-foot below and no more than 2-feet below the top of the upper silt. The borehole shall not be advanced below the bottom of the casing at this stage.
2. Confirming the silt unit depth visually during sampling.
3. The temporary casing is left in place in the silt layer and is not pulled back. Bentonite chips are added so that a minimum of 5-feet thickness of bentonite is in place at the bottom of the borehole and within the casing.
4. Water is added to the bentonite chips and they are allowed to hydrate for at least 1-hour, preferably longer if possible.
5. Smaller telescope size casing is used to advance to the lower silt, if encountered, and the above sealing steps are repeated. Care must be used during drilling so that the borehole is not advanced more than 2-feet below the top of the lower silt.
6. Repeating the Bentonite chip seal sequence described above within the lower silt unit.
7. Next smaller telescope size casing is used to advance the boring to total depth.

General Sampling Approach

- Soils sampled continuously on 5-foot intervals.
  - Logged visually
  - Screened for VOCs using PID
  - Screened for sheen
- Soil sample of lower silt unit (if >2' thick) taken and archived at lab for analysis pending groundwater results.
- Groundwater grab samples at 10-foot intervals as described below for each well based on historical data and nearby wells.

General Analytical Approach

- Groundwater analysis in accordance with Table 23 of the Work Plan (attached), and as follows:
  - TPH-D (run with *and* without silica gel clean-up)
  - TPH-G
  - SVOCs (filtered at lab prior to analysis, as approved by Ecology in approval of the Work Plan)
  - VOCs
  - PCBs
  - Total Metals

- Soil (silt) analysis in accordance with Table 23 of the Work Plan (attached), and as follows:
    - VOCs and PCBs (if detected above screening levels in groundwater)

Well-Location Specific Approach

The following are the proposed groundwater sampling depths and conductor casing targets for each well along with nearby well data guiding sampling rationale:

TWA-9 (CleanCare parcel)

Background:

- Near wells CCW-2A, B, C
- Silt at 14-15' bgs.
- CCW-2B
    - Well Screened @ 11-13' bgs.
- CCW-2C
    - Well Screened @ 19-24' bgs. (in Lower Sand unit)

Approach:

- Log to first silt (about 15 ft) with 8-inch conductor casing set near 15'.
- Advance smaller casing below 15' seal.
- Look for deeper silt unit
- If found, sample silt, seal/set conductor casing and sample first water immediately below, advance next smaller casing below second seal.
    - If 2nd silt not found, collect first water sample at 35-40'
- Three groundwater grab samples @ 35-40', 45-50', 55-60' (since well 2C is already sampling ~ 25')
- Log to 60 ft

TWA-8 (Burlington Env. Parcel, south end of Parcel A)

Background:

- Near CTMW-20
- CTMW-20
    - Silt @ 10.5-11.5
    - Well Screened @ 4-11'
    - Recent groundwater samples below reporting limits

Approach:

- Log to first silt (about 11 ft) and set 8-inch conductor casing near 11',
- Advance smaller casing below seal.
- Look for deeper silt unit
- If found, sample silt, seal/set conductor casing, advance next smaller casing below second seal
- Four groundwater grab samples @ 20-25, 30-35', 40-45', 50-55'

- Log to 60 ft

TWA-7 (Burlington Env. parcel, south end of property)

Background:

- Near CTMW-25
- CTMW-25
  - Silt @ 8.5-13.5
  - Screened 16-21' (in Lower Sand unit)
  - Historically low concentration groundwater

Approach:

- Shift location 60' east due to overhead power – High voltage utility lines
- Log to first silt (about 10 ft) and set 8-inch conductor casing near 10 ft.
- Advance smaller casing below seal.
- Look for deeper silt unit
- If found, sample silt, seal/set conductor casing, advance next smaller casing below second seal
- Three Groundwater grab samples @ 30-35', 40-45', 50-55' (since nearby well CTMW-25D is completed to 21').
- Log to 60 ft

TWA-4 (Burlington Env. Parcel, north end of property)

Background:

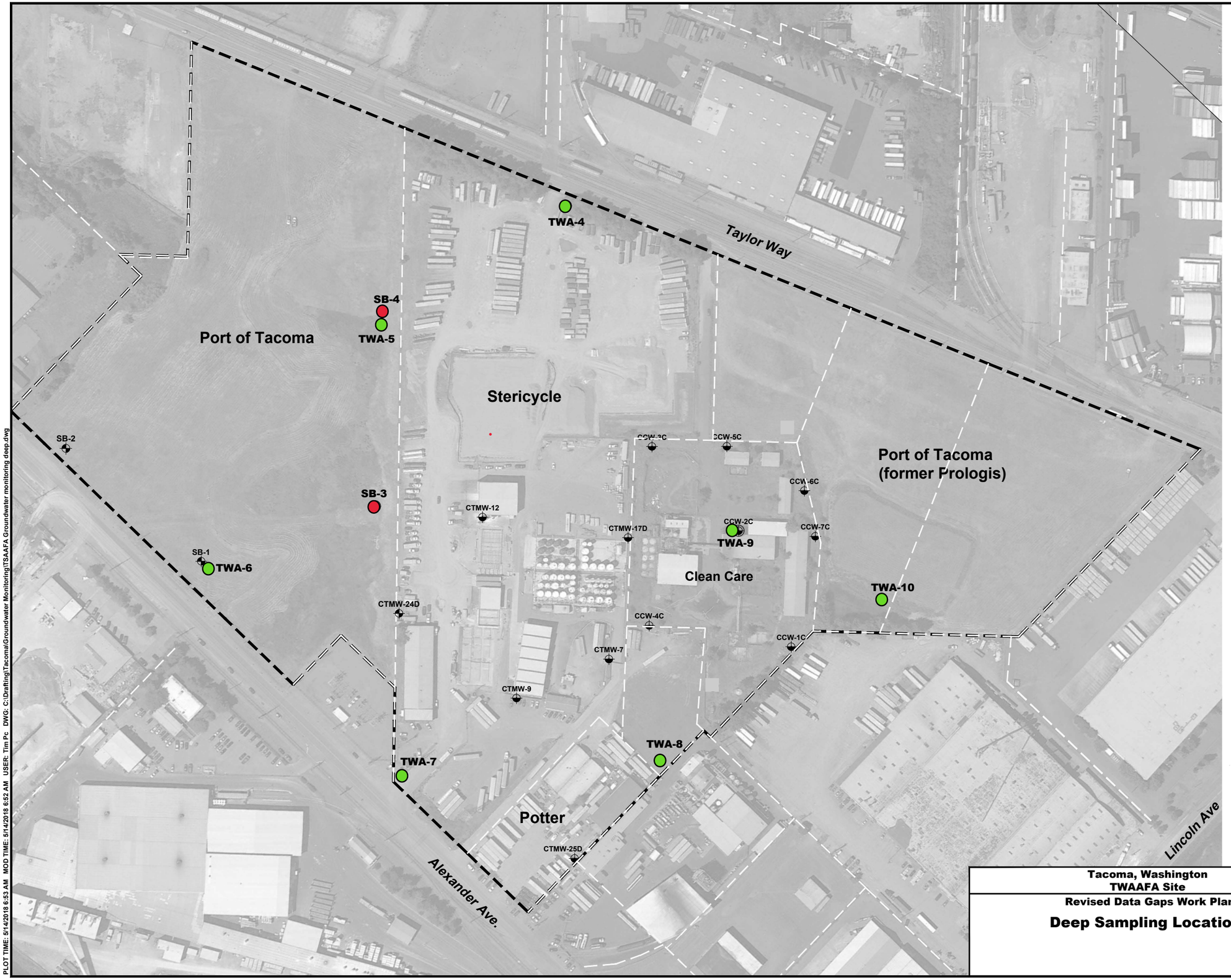
- Near PZ-8
- PZ-8
  - Screened 3-10'
  - Silt @ 10.5-12
  - Clean GW/Soil in 2002

Approach:

- Log to first silt (about 11 ft) and set 8-inch conductor casing near 11 ft.
- Advance smaller casing below seal.
- Look for deeper silt unit
- If found, sample silt, seal/set conductor casing, advance next smaller casing below second seal
- Three Groundwater grab samples @ 30-35', 40-45', 50-55', (since nearby grab at SRI-25D was at 25').
- Log to 60 ft

Attachments:

Figure 51
Table 23



0 200
Scale in Feet

Legend

- CTMW-9 — Existing Deep Well To Be Monitored
- Proposed Deep Groundwater Boring & Possible Well
- Existing Well to be Decommissioned

Tacoma, Washington
TWAAFA Site
Revised Data Gaps Work Plan

Deep Sampling Locations

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FIGURE 51

January 18, 2019

PLOT TIME: 5/14/2018 6:53 AM MOD TIME: 5/14/2018 6:52 AM USER: Tim Pc DWG: C:\Drafting\Tacoma\Groundwater Monitoring\TSAAFA Groundwater monitoring deep.dwg

TABLE 23
DATA GAPS INVESTIGATION TASKS
Taylor Way and Alexander Avenue Fill Area Site
Tacoma, Washington

Data Gaps Task	Notes	Location	Soil Samples						Groundwater Samples						Task Completed?
			VOCs	TPH-D	TPH-G	SVOCs	PCBs	Metals	VOCs	TPH-D	TPH-G	SVOCs	PCBs	Metals	
Mapping of aboveground structures	Map and memorandum	Sitewide	--	--	--	--	--	--	--	--	--	--	--	--	No
Well Condition Evaluation and survey update	Memorandum (including repair/replace/redevelop recommendations)	Sitewide	--	--	--	--	--	--	--	--	--	--	--	--	No
Soil Vapor Intrusion Status and Recommendations	Memorandum (including sampling plan)	Sitewide	--	--	--	--	--	--	--	--	--	--	--	--	Yes
Shallow soil and groundwater sampling[1]	1991 Reported ballast fill, Western Port of Tacoma property	TWA-SB1	X	X	X	X	X	X	X	X	X	X	X	X	Yes
	1981 Reported leachate observed, Western Port of Tacoma property	TWA-SB2	X	X	X	X	X	X	X	X	X	X	X	X	Yes
	1991 Reported demolition debris, Western Port of Tacoma property	TWA-SB3	X	X	X	X	X	X	X	X	X	X	X	X	Yes
	1991 Reported debris-empty drums & paint cans, Western Port of Tacoma property	TWA-SB4	X	X	X	X	X	X	X	X	X	X	X	X	Yes
	Former SEA-14 soil sample location, Parcel A, Stericycle property	TWA-SB5	X	X	X	X	X	X	--	--	--	--	--	--	No
Discrete depth deep soil and groundwater sampling[2]	Stericycle property, north end	TWA-4	X[7]	--	--	--	--	--	X	X	X	X	X	X	No
	Western Port of Tacoma property, replacing SB-4	TWA-5	X[7]	--	--	--	--	--	X	X	X	X	X	X	Yes
	Western Port of Tacoma property, replacing SB-1	TWA-6	X[7]	--	--	--	--	--	X	X	X	X	X	X	Yes
	Stericycle property, south end, near CTMW-14	TWA-7	X[7]	--	--	--	--	--	X	X	X	X	X	X	No
	Stericycle property, south end of Parcel A, near CTMW-20	TWA-8	X[7]	--	--	--	X	--	X	X	X	X	X	X	No
	CleanCare property, near CCW-2C	TWA-9	X[7]	--	--	--	X	--	X	X	X	X	X	X	No
	1514 Taylor Way property, sound end	TWA-10	X[7]	--	--	--	--	--	X	X	X	X	X	X	No
Well Abandonment[3]	Western Port of Tacoma property	SB-1, SB-3, SB-4	--	--	--	--	--	--	--	--	--	--	--	--	Yes
Well Rehabilitation[4]		TBD	--	--	--	--	--	--	--	--	--	--	--	--	No
Shallow well installation	1514 Taylor Way property	TWA-1	--	--	--	--	--	--	--	--	--	--	--	--	No
		TWA-2	--	--	--	--	--	--	--	--	--	--	--	--	No
		TWA-3	--	--	--	--	--	--	--	--	--	--	--	--	No
	Stericycle property	CTMW-23R	--	--	--	--	--	--	--	--	--	--	--	--	No
Deep Aquifer well installation[5]	Characterization of deeper deep aquifer	TWA-4	--	--	--	--	--	--	--	--	--	--	--	--	No
	Replacement well	TWA-5	--	--	--	--	--	--	--	--	--	--	--	--	Yes
	Replacement well	TWA-6	--	--	--	--	--	--	--	--	--	--	--	--	Yes
	Characterization of deeper deep aquifer	TWA-7	--	--	--	--	--	--	--	--	--	--	--	--	No
	Characterization of deeper deep aquifer	TWA-8	--	--	--	--	--	--	--	--	--	--	--	--	No
	Possible deeper deep aquifer characterization below CCW-2C	TWA-9	--	--	--	--	--	--	--	--	--	--	--	--	No
	Deep aquifer characterization	TWA-10	--	--	--	--	--	--	--	--	--	--	--	--	No
Groundwater sampling and elevation measurement and mapping	Quarterly groundwater data analysis reports to be produced after each event.	Sitewide	--	--	--	--	--	--	see Groundwater Monitoring Plan						No

Notes:

1. At each soil sample location, one sample will be collected from approximately 1-2 feet bgs, and one sample will be collected above the apparent water table.
   Additional soil samples will be collected in the following circumstances: one of the waste fills materials is encountered, there are field indications of volatile contaminants or sheens
   Shallow groundwater samples will be collected at the water table.
2. Depth discrete samples will be collected from 3 to 4 different intervals below the silt unit.
   Anticipated depths are approxiately 20, 30, 40, and 50 with the intent of sampling transmissive zones of this interbedded aquifer.
   Conductor cased sampling methods will be used to seal the upper fill from the deep aquifer.
3. Additional wells may be recommended for abandonment after the well condition evaluation task is completed.
4. Locations to be determined as part of the well condition evaluation task.
5. Well screen depths will be based on results of discrete depth sampling evaluation.
6. Metals include: arsenic, cadmium, chromium, copper, lead, mercury, nickel, zinc, manganese, selenium
7. To be collected from fine-grained units encountered below the silt unit.