October 23, 2019

Darius Thompson
City of Tacoma
Public Works Department, Engineering Division
747 Market Street, Room 420
Tacoma, WA 98402-3769

Re: Groundwater Monitoring Results, April 2019
Thea Foss Waterway Esplanade, Thea Foss Upland
Tacoma, Washington
17646-03

Dear Mr. Thompson:

This letter transmits the results of the April 2019 groundwater monitoring event conducted for the above-referenced site (Figure 1). The sampling was performed in accordance with our proposal dated December 4, 2018, and involved collecting and analyzing groundwater samples from the following monitoring wells (Figure 2):

- MW-2
- MW-5
- P3-MW-01R
- P3-MW-02
- P3-MW-03
- Landau Well

Samples were collected using low-flow techniques and were analyzed for dissolved arsenic, copper, lead, nickel, and zinc by the City of Tacoma Environmental Services Laboratory using Method 6020B. All wells were sampled within about 2.5 hours of low tide in the adjacent Thea Foss Waterway, which occurred at 2:32 PM.

Table 1 presents the static water levels measured in each well. Hart Crowser's field groundwater sampling data forms are included as Attachment 1. The laboratory report, along with our data quality review, is included as Attachment 2.

Table 2 summarizes the results of the chemical analyses and compares them to groundwater- and surface water-based cleanup levels. Samples from P3-MW-03 and the Landau Well exceeded the Model Toxics Control Act (MTCA) Method A cleanup level for groundwater for arsenic of 5 µg/L. Well P3-MW-03 also slightly exceeded the state's surface water standards for protection of human

health for arsenic of 10 µg/L. All wells exceeded the MTCA Method B cancer groundwater cleanup level of 0.098 µg/L (however, it should be noted that this level is significantly lower than concentrations representative of background arsenic concentrations in groundwater in Washington as reflected by the MTCA Method A groundwater cleanup level of 5 µg/L).

We trust that this report meets your needs. Please contact me with any questions or if you would like to discuss further.

Sincerely,

HART CROWSER, INC.

MARK DAGEL, LHG
Senior Associate Hydrogeologist
Mark.dagel@hartcrowser.com

Attachments:
Figure 1 – Vicinity Map
Figure 2 – Well Locations
Table 1 – Water-Level Measurements
Table 2 – Analytical Results
Attachment 1 – Groundwater Sampling Field Forms
Attachment 2 – Data Quality Review & Laboratory Data Report

L:\Notebooks\1764603_ City_of_Tacoma_GW_Monitoring\Deliverables\Reports\GW Monitoring\GW Mon Report_April_2019.docx

Table 1 - Water-Level Measurements

Well	Time	Depth to Water (feet)
MW-2	2:30 PM	11.81
MW-5	11:58 AM	9.46
P3-MW-01R	12:31 PM	8.55
P3-MW-02	2:55 PM	5.43
P3-MW-03	1:45 PM	8.73
Landau Well	3:40 PM	12.03

Notes:
Measurements taken on 4/9/19
Depth to water measured from top of PVC well casings.

Table 2 - Analytical Results

	Monitoring Well						Regulatory Levels			
							Groundwater Cleanup Levels Chapter 173-340 WAC		Surface Water Standards for Marine Waters Chapter 173-201A WAC	
Dissolved Metals	MW-2	MW-5	P3-MW-01R	P3-MW-02	P3-MW-03	Landau Well	Method A	Method B, Cancer	Aquatic Life, Chronic	Human Health
Arsenic	*1.23*	*1.03*	*1.58*	*2.52*	***10.8***	***5.73***	5 (a)	0.098	36	10
Copper	0.318 T	2.41	3.09	0.249 T	4.97	0.529	-	-	3.1	-
Lead	0.5 U	0.5 U	0.0061 U	0.169 T	0.5 U	0.0061 U	15	-	8.1	-
Nickel	0.965	0.845	1.11	0.411 T	1.53	2.83	-	-	8.2	190
Zinc	17.6	3.25	2.77	1.85	2.07	2.41	-	-	81	2900

Notes:

Analyses performed by City of Tacoma Environmental Services Laboratory using Method 6020B.

U = Not detected at detection limit indicated.

T = Value is between the MDL and RL.

Samples collected on 4/9/2019.

Monitoring well values represent dissolved metals concentrations (laboratory filtered).

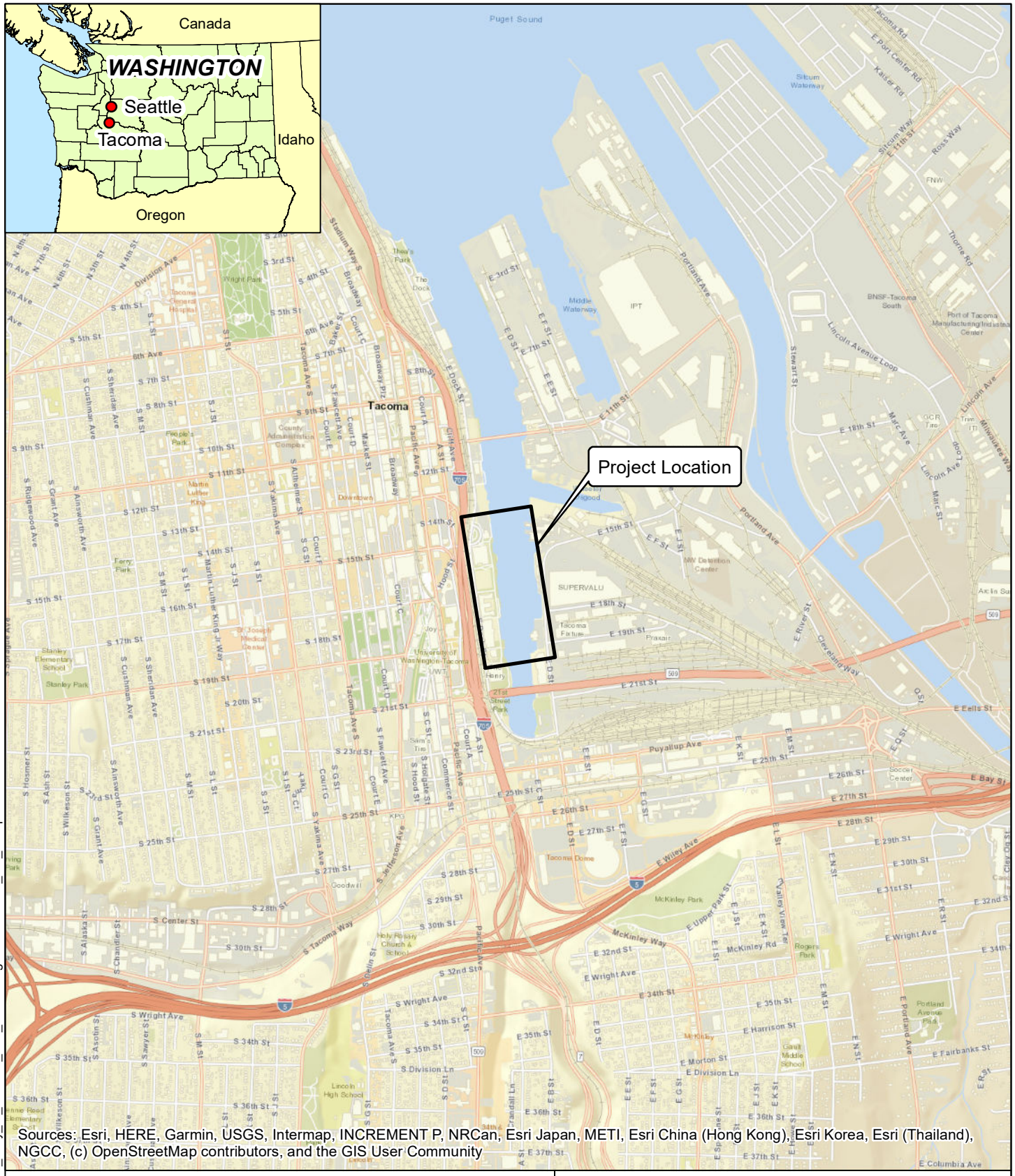
All concentrations in µg/L.

Bolded values indicate concentration exceeds Method A groundwater cleanup level.

Italicized values idicate concentration exceeds Method B groundwater cleanup level.

Shaded values indicate concentration exceeds surface water standard.

(a) Arsenic cleanup level based on background groundwater concentrations for state of Washington.



0 1,000 2,000 4,000 Feet

Note: Feature locations are approximate.

N

Thea Foss Waterway Esplanade
Tacoma, Washington

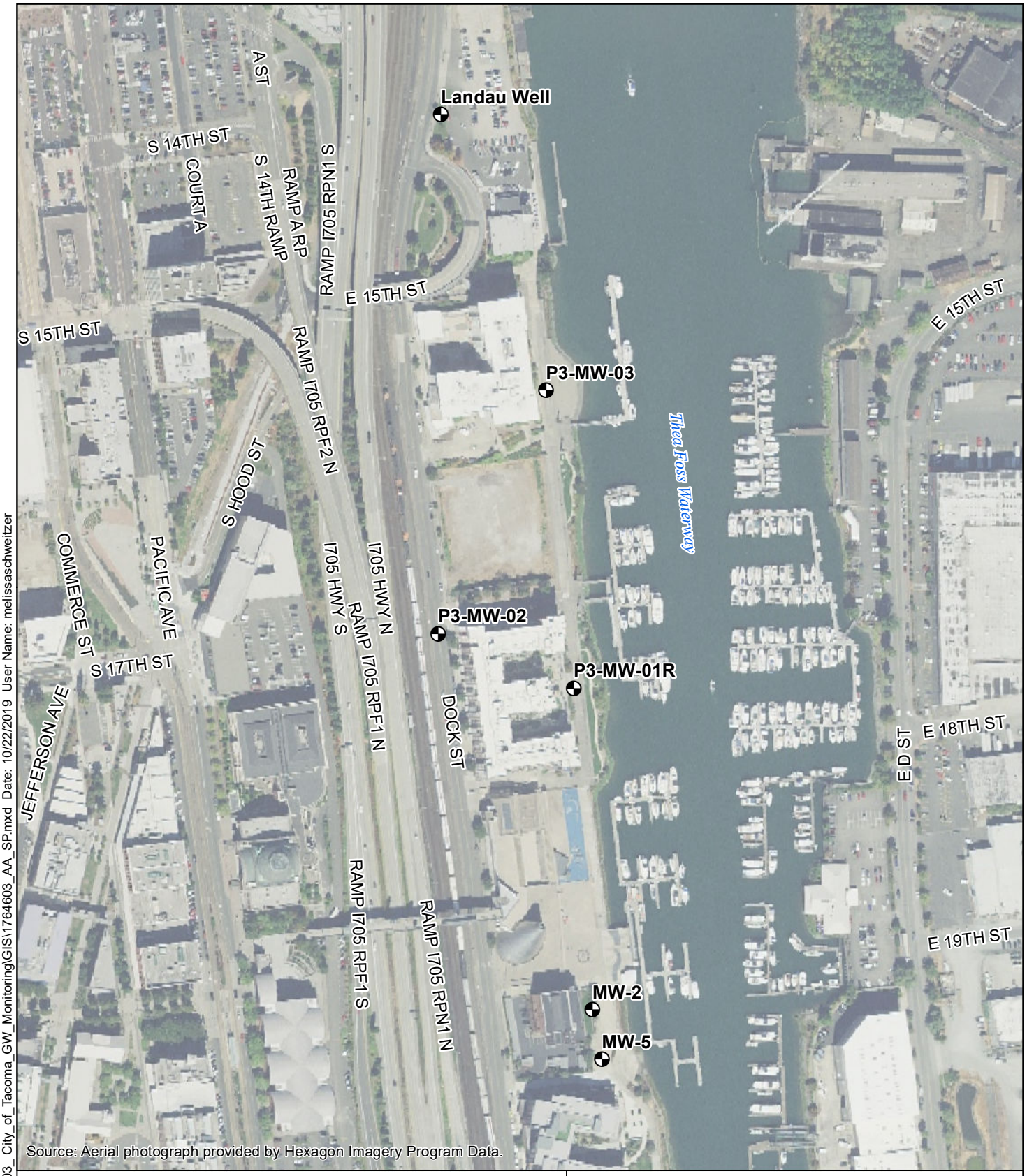
Vicinity Map

17646-03 10/19

HARTCROWSER

Figure 1

Document Path: L:\Notebooks\1764603_City_of_Tacoma_GW_Monitoring\GIS\1764603_AB_VMap.mxd Date: 10/22/2019 User Name: melissaschweitzer



Source: Aerial photograph provided by Hexagon Imagery Program Data.

Legend

Monitoring Well

0 150 300 600 Feet

Note: Feature locations are approximate.

N

Thea Foss Waterway Esplanade
Tacoma, Washington

Well Locations

17646-03 10/19

HARTCROWSER

Figure 2

Document Path: L:\Notebooks\1764603_City_of_Tacoma_GW_Monitoring\GIS\1764603_AA_SP.mxd Date: 10/22/2019 User Name: melissaschweitzer

ATTACHMENT 1
Groundwater Sampling Field Forms

HARTCROWSER Groundwater Sampling Data - Well I.D. MW-5

WELL LOCATION DESC. (for new wells) _____
(e.g., *20' NW of E corner of building A*)

PROJECT Foss Esplanade Tacoma
JOB NO. 17646-03
PROJECT MANAGER Dagel
FIELD REPS Dagel & Stratigos

DATE/TIME SAMPLED 4/9/19 @ 1158
TIDALLY INFLUENCED YES X NO _____
WELL DEPTH IN FEET 21.20'
SCREENED INTERVAL IN FEET 10-20'

(1) Purging Data/Field Measurements: *All Measurements Relative to Top of Casing (TOC)*

WELL DEPTH _____
DEPTH TO SEDIMENT (DTS) IN FEET 21.20'
DEPTH TO WATER (DTW) IN FEET 9.46'
(DTS – DTW) 11.74

CASING VOLUME IN GALLONS 1.91
[2" diam = x .163 gal/ft 4" diam = x .653 gal/ft]
PURGE VOLUME IN GALLONS _____
ACTUAL PURGE IN GALLONS 1.5

Time	No. of Gallons Purged	pH	Temp in °C	Conduct in uS/cm	Diss. Oxygen in %	Turbidity	ORP in MV	Comments: quality, recovery, color, odor, sheen, accumulated silt/sand
1152	0.5	5.82	12.8	1022	2.8	29.4	102.0	Clear, NO, NS
1153	1	6.01	12.5	1008	5.8	25.1	80.6	Clear, NO, NS
1154	1.1	6.12	12.5	1007	4.0	21.3	72.9	Clear, NO, NS
1156	1.5	6.21	12.6	1008	3.1	17.7	62.7	Clear, NO, NS
sample: 1158								

Comments: pump @ 16' bgs

	Method	Pumping Rate in GPM	Depth of Equip. in Feet
Purge	Sub. pump	0.2	16'
Sample	Sub. pump	0.2	16'

Boils dry? Yes _____ No X
At no. of casing volumes _____
Purge Water Disposal Method/Volume drum on site

(2) Sampling Data

Bottle Type	# of Containers	Analyses	Preserv.	Filter
PE	1	Metals	N	N

Total number of Bottles 1
Duplicate Sample I.D. _____
Field Blank I.D. _____
Rinseate Sample I.D. _____

(3) Field Equipment

Type/Brand/Serial No./Material Units

Pump Type/Tubing Type Subpump SS./PE
Bailer Type —
Filter Type —

Temp/pH/E.C. meter YSI Pro DSS
Water Level Probe Solinst
Other _____

(4) Well Conditions

OK [X] Not OK [ ] Explain _____

sample ID: MW-5-040919

HARTCROWSER Groundwater Sampling Data - Well I.D. P3-MW01R

WELL LOCATION DESC. (for new wells) _____
(e.g., *20' NW of E corner of building A*)

PROJECT Foss Waterway Esplanade
JOB NO. 17646-03
PROJECT MANAGER _____
FIELD REPS Dobler + Shaljian

DATE/TIME SAMPLED 4/9/19 @ 1231
TIDALLY INFLUENCED YES X NO _____
WELL DEPTH IN FEET 10.93'
SCREENED INTERVAL IN FEET 5-10?

(1) Purging Data/Field Measurements: *All Measurements Relative to Top of Casing (TOC)*

WELL DEPTH 10.93'
DEPTH TO SEDIMENT (DTS) IN FEET 10.93'
DEPTH TO WATER (DTW) IN FEET 4.55'
(DTS – DTW) 2.38'

CASING VOLUME IN GALLONS 0.3588
[2" diam = x .163 gal/ft 4" diam = x .653 gal/ft]
PURGE VOLUME IN GALLONS 0.4
ACTUAL PURGE IN GALLONS 0.4

Time	No. of Gallons Purged	pH	Temp in °C	Conduct in µS/cm	Diss. Oxygen in mg/L	Turbidity	ORP in mV	Comments: quality, recovery, color, odor, sheen, accumulated silt/sand
1226	0.1	6.18	13.1	789	5.43	1.9	266.1	Clear, NO, NS
1227	0.1	6.46	12.8	801	5.31	-1.6	255.1	Clear, NO, NS
1229	0.2	6.55	12.9	804	5.09	-2.6	247.7	Clear, NO, NS
1230	0.3	6.58	12.9	806	5.02	-3.0	244.4	Clear, NO, NS
sample: 1231	1							

Comments: _____

	Method	Pumping Rate in GPM	Depth of Equip. in Feet
Purge	Sub. pump	0.1	10'
Sample	"	"	"

Boils dry? Yes _____ No X
At no. of casing volumes _____
Purge Water Disposal Method/Volume
drum on site

(2) Sampling Data

Bottle Type	# of Containers	Analyses	Preserv.	Filter
PE	1	Metals	N	N

Total number of Bottles 1
Duplicate Sample I.D. _____
Field Blank I.D. _____
Rinseate Sample I.D. _____

(3) Field Equipment

Type/Brand/Serial No./Material Units

Pump Type/Tubing Type Sub.pump SS/PE
Bailer Type —
Filter Type _____

Temp/pH/E.C. meter YSI Pro DSS
Water Level Probe solinst
Other _____

(4) Well Conditions

OK [X] Not OK [ ] Explain Note: Monument was filled w/ water, so bailed, screws difficult to put back in.

HARTCROWSER Groundwater Sampling Data - Well I.D. P3-MW03

WELL LOCATION DESC. (for new wells) _____
(e.g., *20' NW of E corner of building A*)

PROJECT: FOSS Waterway Esplanade
JOB NO.: 17646-03
PROJECT MANAGER: Degel
FIELD REPS: Dozier + Shreijian

DATE/TIME SAMPLED: 4/9/19 @1345
TIDALLY INFLUENCED: YES X NO ____
WELL DEPTH IN FEET: 10.74
SCREENED INTERVAL IN FEET: 5-10'?

(1) Purging Data/Field Measurements: *All Measurements Relative to Top of Casing (TOC)*

WELL DEPTH: 10.74'
DEPTH TO SEDIMENT (DTS) IN FEET: 10.74'
DEPTH TO WATER (DTW) IN FEET: 8.73'
(DTS – DTW): 2.01'

CASING VOLUME IN GALLONS: 0.327
[2" diam = x .163 gal/ft 4" diam = x .653 gal/ft]
PURGE VOLUME IN GALLONS: ____
ACTUAL PURGE IN GALLONS: 1

Time	No. of Gallons Purged	pH	Temp in °C	Conduct in uS/cm	Diss. Oxygen in mg/L	Turbidity	ORP in MV	Comments: quality, recovery, color, odor, sheen, accumulated silt/sand
1340	0.1	6.15	12.9	718	1.19	0.9	146.4	Clear, NO, NS
1341	0.1	6.36	12.6	719	0.66	-1.9	115.3	Clear, NO, NS
1342	0.2	6.50	12.5	720	0.45	-2.9	98.7	Clear, NO, NS
1343	0.3	6.59	12.4	718	0.39	-3.1	90.2	Clear, NO, NS
sample: 1345								

Comments: _____

	Method	Pumping Rate in GPM	Depth of Equip. in Feet
Purge	Sub. pump	0.2	9
Sample	"	"	"

Boils dry? Yes ____ No X
At no. of casing volumes ____
Purge Water Disposal Method/Volume: drums on site

(2) Sampling Data

Bottle Type	# of Containers	Analyses	Preserv.	Filter
PE	1	metals	N	N

Total number of Bottles: 1
Duplicate Sample I.D. ____
Field Blank I.D. ____
Rinseate Sample I.D. ____

(3) Field Equipment — Type/Brand/Serial No./Material Units

Pump Type/Tubing Type: Sub. Pump SS/PE
Bailer Type: —
Filter Type: —

Temp/pH/E.C. meter: YSI Pro DSS
Water Level Probe: Solinst
Other: _____

(4) Well Conditions

OK ☑ Not OK ☐ Explain _____

Ecol. Tag: AHG-787

HARTCROWSER Groundwater Sampling Data - Well I.D. MW-2

WELL LOCATION DESC. (for new wells)
(e.g., *20' NW of E corner of building A*)

PROJECT FOSS
JOB NO. 17646-03
PROJECT MANAGER Dagel
FIELD REPS Dagel + Shelji

DATE/TIME SAMPLED 4/9/19 @1430
TIDALLY INFLUENCED YES X NO
WELL DEPTH IN FEET 25.95'
SCREENED INTERVAL IN FEET 15-25'?

1 Purging Data/Field Measurements: *All Measurements Relative to Top of Casing (TOC)*

WELL DEPTH 25.95'
DEPTH TO SEDIMENT (DTS) IN FEET 25.95'
DEPTH TO WATER (DTW) IN FEET 11.81'
(DTS – DTW) 14.14'

CASING VOLUME IN GALLONS 2.304
[2" diam = x .163 gal/ft 4" diam = x .653 gal/ft]
PURGE VOLUME IN GALLONS
ACTUAL PURGE IN GALLONS 2.2

	Time	No. of Gallons Purged	pH	Temp in °C	Conduct in µS/cm	Diss. Oxygen in Mg/L	Turbidity	ORP in mV	Comments: quality, recovery, color, odor, sheen, accumulated silt/sand
	1419	0.1	6.50	13.5	1555	0.59	166.2	27.3	turbid, NS, organic odor
	1420	0.2	6.49	13.4	1530	0.43	125.1	22.1	slightly turbid, NS, strong organic odor
	1422	0.3	6.48	13.4	1510	0.35	102.2	16.5	slightly turbid, NS, s.org. odor
	1427	0.2	6.49	13.2	1150	0.42	95.2	14.1	s.turbid, NS, organic odor
sample:	1430	2.2							

Comments:

	Method	Pumping Rate in GPM	Depth of Equip. in Feet
Purge	Sub. Pump	0.2	19
Sample	"	"	"

Boils dry? Yes ____ No X
At no. of casing volumes ____
Purge Water Disposal Method/Volume
drum on site

2 Sampling Data

Bottle Type	# of Containers	Analyses	Preserv.	Filter
PE	1	Metals	N	N

Total number of Bottles 1
Duplicate Sample I.D.
Field Blank I.D.
Rinseate Sample I.D.

3 Field Equipment

Type/Brand/Serial No./Material Units

Pump Type/Tubing Type SS. Sub. Pump/PE
Bailer Type —
Filter Type

Temp/pH/E.C. meter YSI Pro DSS
Water Level Probe Solinst
Other

4 Well Conditions

OK X Not OK ☐ Explain

HARTCROWSER Groundwater Sampling Data - Well I.D. P3-MW2

4, Note: this well is in the road!

WELL LOCATION DESC. (for new wells) _____
(e.g., *20' NW of E corner of building A*)

PROJECT Foss Waterway Esplanade
JOB NO. 17646-03
PROJECT MANAGER Daggel
FIELD REPS Dozier & Khaljian

DATE/TIME SAMPLED 4/9/19 @ 1455
TIDALLY INFLUENCED YES X NO ____
WELL DEPTH IN FEET 14.43'
SCREENED INTERVAL IN FEET ?

(1) Purging Data/Field Measurements: *All Measurements Relative to Top of Casing (TOC)*

WELL DEPTH 14.43'
DEPTH TO SEDIMENT (DTS) IN FEET 14.43'
DEPTH TO WATER (DTW) IN FEET 5.43'
(DTS – DTW) 9

CASING VOLUME IN GALLONS 1.467
[2" diam = x .163 gal/ft 4" diam = x .653 gal/ft]
PURGE VOLUME IN GALLONS ____
ACTUAL PURGE IN GALLONS 0.5

	Time	No. of Gallons Purged	pH	Temp in °C	Conduct in ~~uS/cm~~	Diss. Oxygen in ~~mg/L~~	Turbidity	ORP in ~~MV~~	Comments: quality, recovery, color, odor, sheen, accumulated silt/sand
	1452	0.1	6.18	11.2	378.6	0.58	110	37.3	clear, ~~NO~~, NS, organic odor
	1453	0.2	6.33	11.2	384.3	0.43	96.8	20.8	clear, ~~NO~~, NS, organic odor
	1454	0.3	6.47	11.2	390.2	0.32	~~88.8~~	5.2	clear, ~~NO~~, NS, organic odor
sample:	1455	0.4							

Comments: _____

	Method	Pumping Rate in GPM	Depth of Equip. in Feet
Purge	Sub. Pump	0.2	10'
Sample	"	"	"

Boils dry? Yes ____ No X
At no. of casing volumes ____

Purge Water Disposal Method/Volume
drum on site

(2) Sampling Data

Bottle Type	# of Containers	Analyses	Preserv.	Filter
PE	1	Metals	N	N

Total number of Bottles 1

Duplicate Sample I.D. ____
Field Blank I.D. ____
Rinseate Sample I.D. ____

(3) Field Equipment

Type/Brand/Serial No./Material Units

Pump Type/Tubing Type SS Sub. Pump / PE
Bailer Type —
Filter Type —

Temp/pH/E.C. meter YSI PTO DSS
Water Level Probe Solinst
Other ____

(4) Well Conditions

OK [X] Not OK [ ] Explain 2 screws missing

HARTCROWSER Groundwater Sampling Data - Well I.D. Landau Well

WELL LOCATION DESC. (for new wells) _____
(e.g., *20' NW of E corner of building A*)

PROJECT Foss Waterway Esplanade — DATE/TIME SAMPLED 4/9/19 @1540

JOB NO. 17646-03 — TIDALLY INFLUENCED YES X NO _____

PROJECT MANAGER Dogel — WELL DEPTH IN FEET 30.02

FIELD REPS Dogel + Shelijian — SCREENED INTERVAL IN FEET ?

(1) Purging Data/Field Measurements: *All Measurements Relative to Top of Casing (TOC)*

WELL DEPTH 30.02 — CASING VOLUME IN GALLONS 2.93

DEPTH TO SEDIMENT (DTS) IN FEET 30.02 — [2" diam = x .163 gal/ft 4" diam = x .653 gal/ft]

DEPTH TO WATER (DTW) IN FEET 12.03 — PURGE VOLUME IN GALLONS _____

(DTS – DTW) 17.99 — ACTUAL PURGE IN GALLONS 0.5

Time	No. of Gallons Purged	pH	Temp in °C	Conduct in uS/cm	Diss. Oxygen in mg/L	Turbidity	ORP in mV	Comments: quality, recovery, color, odor, sheen, accumulated silt/sand
1536	0.1	6.29	14.6	609	0.70	15.1	-5.9	clear, NS, organic odor
1537	0.2	6.55	14.6	614	0.55	14.3	-19.5	clear, NS, org. odor
1538	0.3	6.64	14.5	617	0.43	13.7	-32.9	clear, NS, org. odor
1539	0.4	6.70	14.5	620	0.34	13.3	-44.5	clear, NS, org. odor
sample: 1540	0.5							

Comments: _____

	Method	Pumping Rate in GPM	Depth of Equip. in Feet
Purge	Sub pump	0.1	21'
Sample	"	"	"

Boils dry? Yes _____ No X

At no. of casing volumes _____

Purge Water Disposal Method/Volume drum on site

(2) Sampling Data

Bottle Type	# of Containers	Analyses	Preserv.	Filter
PE	1	metals	N	N

Total number of Bottles 1

Duplicate Sample I.D. _____

Field Blank I.D. _____

Rinseate Sample I.D. _____

(3) Field Equipment

Type/Brand/Serial No./Material Units

Pump Type/Tubing Type SS Sub Pump / PE — Temp/pH/E.C. meter YSI Pro DSS

Bailer Type — — Water Level Probe solinst

Filter Type — — Other _____

(4) Well Conditions

OK ☐ Not OK ☒ Explain Monument is cracked and there are no bolts

ATTACHMENT 2
Data Quality Review & Laboratory Data Report

ATTACHMENT 2
DATA QUALITY REVIEW & LABORATORY REPORT

Chemical Data Quality Review

Six groundwater samples were collected on April 9, 2019. The samples were submitted to the City of Tacoma's Environmental Services Laboratory in Tacoma, Washington, for chemical analyses. The results were reported as SDG 1904071.

The groundwater samples were analyzed for dissolved metals (arsenic, copper, lead, nickel, and zinc) by EPA Method 6020B.

The laboratory performed quality assurance/quality control (QA/QC) reviews on an ongoing basis. Hart Crowser reviewed a summary report to ensure it met data quality objectives for the project and recorded the results on laboratory quality control summary sheets.

The following criteria were evaluated during the standard data quality review process:

- Holding times;
- Reporting limits;
- Method blanks (MB);
- Laboratory duplicate relative percent differences (RPDs);
- Laboratory control sample recoveries; and
- Matrix spike recoveries.

The data were determined to be acceptable for use with minor qualifications. The complete laboratory report is presented at the end of this appendix. The data review is summarized in the following pages.

Reporting Limits

Reporting limits are set by the laboratory and are based on instrumentation abilities, sample matrix, and suggested reporting limits by the Environmental Protection Agency (EPA) or Washington State Department of Ecology (Ecology). In some cases, the reporting limit is raised because of high analyte concentrations in the samples or matrix interferences. When sample results are between the method detection limit (MDL) and the reporting limit (RL), the laboratory flagged the result with a "J." This J flag was changed to a T to match Environmental Information Management (EIM) database requirements.

Sample Receiving Notes

The samples were filtered and preserved at the laboratory for dissolved metals analysis.

Groundwater Results

Dissolved Metals by EPA 6020B

Holding times and reporting limits were acceptable. LCS and MS recoveries were within control limits. No method blank contamination was detected. The laboratory duplicate RPDs were in control.

The closing continuing calibration blank (CCB) had a detection for lead between the MDL and the RL. The laboratory qualified the associated samples (MW5-040919, MW2-040919, and P3-MW3-040919) with "UJ". The results for lead in those samples was raised to the reporting limit and qualified as not detected (U).

Laboratory Data Report

Tacoma SURFACEWATER SOLIDWASTE WASTEWATER
ENVIRONMENTAL SERVICES DEPARTMENT

18 April 2019

Darius Thompson
PW Engineering
747 Market Street, Rm 744
Tacoma, WA 98402

Subject: Foss Upland Esplanade

Enclosed are the analytical results for samples collected 04/09/2019.

Quality Control Data are included with the sample results for your review.

If you have any questions concerning this report, call me at (253)502-2130. Please note that remaining samples associated with this report will be discarded **3 months** from the date of this report unless we are notified otherwise.

Sincerely,

Stuart Magoon
Assistant Division Manager
Environmental Services Laboratory

cc.

PW Engineering	Project: **Foss Upland Esplanade**	
747 Market Street, Rm 744	Project Number: PWK-00423-01-01	**Reported:**
Tacoma WA, 98402	Project Manager: Darius Thompson	18-Apr-19 16:28

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled
P3MW2-040919	1904071-01	Water	09-Apr-19 14:55
MW5-040919	1904071-02	Water	09-Apr-19 11:58
MW2-040919	1904071-03	Water	09-Apr-19 14:30
P3-MW03-040919	1904071-04	Water	09-Apr-19 13:45
P3-MW01R-040919	1904071-05	Water	09-Apr-19 12:31
LANDAU-040919	1904071-06	Water	09-Apr-19 15:40

CHAIN OF CUSTODY, SAMPLE RECEIPT, PRESERVATION AND STORAGE

Samples were received under appropriate Chain of Custody procedures. Containers were properly preserved and stored in accordance with the applicable method requirements.

HOLDING TIMES

All analyses were performed within the required holding times.

METHODS

The samples were analyzed by the following methods:

EPA Method 6020B

MINIMUM REPORTING LIMITS

All analytes are reported to the Practical Quantitation Limit (PQL) which is below or no greater than the Minimum Project Reporting Limit.

BLANKS

Blanks were analyzed at the required frequencies of the methods. Analytes were not detected in the blanks, sample concentrations were greater than 10 times the blank values, or the analytes detected in the blanks were not detected in associated samples with the following exception: the final continuing calibration blank (CCB) had a Lead (Pb) value higher than the method detection limit (MDL). Therefore, Pb values for samples 1904071-02, -03 and -04 were qualified as not detected at the reported estimated value (UJ).

LABORATORY CONTROL SAMPLES

Laboratory Control Samples were analyzed with these samples. The recoveries were within the laboratory limits.

DUPLICATE SAMPLE ANALYSIS

Duplicate analysis was performed with these samples. Relative percent differences were within the laboratory limits for analyte concentrations greater than 5 times the reporting limit.

MATRIX SPIKE ANALYSIS

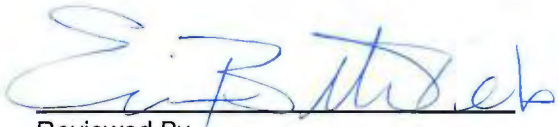
Matrix Spike analysis was performed with these samples. The recoveries were within the laboratory limits.

DATA AVAILABILITY

All data associated with the samples referenced in this report are archived at the Environmental Services Laboratory and are available upon request.

PW Engineering	Project: **Foss Upland Esplanade**	
747 Market Street, Rm 744	Project Number: PWK-00423-01-01	**Reported:**
Tacoma WA, 98402	Project Manager: Darius Thompson	18-Apr-19 16:28

The results included in this report have been reviewed for compliance with the laboratory QA/QC plan and project QAPP.



Reviewed By

PW Engineering	Project: **Foss Upland Esplanade**	
747 Market Street, Rm 744	Project Number: PWK-00423-01-01	**Reported:**
Tacoma WA, 98402	Project Manager: Darius Thompson	18-Apr-19 16:28

P3MW2-040919

1904071-01 (Water)

09-Apr-19 14:55

Analyte	Result	PQL	MDL	Units
Metals				
EPA 6020B	Prepared: 16-Apr-19 Analyzed: 16-Apr-19			
Arsenic, Dissolved	**2.52**	0.500	0.050	ug/L
Copper, Dissolved	**0.249 J**	0.500	0.022	ug/L
Lead, Dissolved	**0.169 J**	0.500	0.0061	ug/L
Nickel, Dissolved	**0.411 J**	0.500	0.012	ug/L
Zinc, Dissolved	**1.85**	0.50	0.22	ug/L

PW Engineering	Project: **Foss Upland Esplanade**	
747 Market Street, Rm 744	Project Number: PWK-00423-01-01	**Reported:**
Tacoma WA, 98402	Project Manager: Darius Thompson	18-Apr-19 16:28

MW5-040919

1904071-02 (Water)

09-Apr-19 11:58

Analyte	Result	PQL	MDL	Units
Metals				
EPA 6020B	Prepared: 16-Apr-19 Analyzed: 16-Apr-19			
Arsenic, Dissolved	**1.03**	0.500	0.050	ug/L
Copper, Dissolved	**2.41**	0.500	0.022	ug/L
Lead, Dissolved	**0.0140 UJ**	0.500	0.0061	ug/L
Nickel, Dissolved	**0.845**	0.500	0.012	ug/L
Zinc, Dissolved	**3.28**	0.50	0.22	ug/L

PW Engineering	Project: **Foss Upland Esplanade**	
747 Market Street, Rm 744	Project Number: PWK-00423-01-01	**Reported:**
Tacoma WA, 98402	Project Manager: Darius Thompson	18-Apr-19 16:28

MW2-040919

1904071-03 (Water)

09-Apr-19 14:30

Analyte	Result	PQL	MDL	Units
Metals				
EPA 6020B	Prepared: 16-Apr-19 Analyzed: 16-Apr-19			
Arsenic, Dissolved	**1.23**	0.500	0.050	ug/L
Copper, Dissolved	**0.318 J**	0.500	0.022	ug/L
Lead, Dissolved	**0.0100 UJ**	0.500	0.0061	ug/L
Nickel, Dissolved	**0.965**	0.500	0.012	ug/L
Zinc, Dissolved	**17.6**	0.50	0.22	ug/L

PW Engineering	Project: **Foss Upland Esplanade**	
747 Market Street, Rm 744	Project Number: PWK-00423-01-01	**Reported:**
Tacoma WA, 98402	Project Manager: Darius Thompson	18-Apr-19 16:28

P3-MW03-040919

1904071-04 (Water)

09-Apr-19 13:45

Analyte	Result	PQL	MDL	Units
Metals				
EPA 6020B	Prepared: 16-Apr-19 Analyzed: 16-Apr-19			
Arsenic, Dissolved	**10.8**	0.500	0.050	ug/L
Copper, Dissolved	**4.97**	0.500	0.022	ug/L
Lead, Dissolved	**0.233 UJ**	0.500	0.0061	ug/L
Nickel, Dissolved	**1.53**	0.500	0.012	ug/L
Zinc, Dissolved	**2.07**	0.50	0.22	ug/L

PW Engineering	Project: **Foss Upland Esplanade**	
747 Market Street, Rm 744	Project Number: PWK-00423-01-01	**Reported:**
Tacoma WA, 98402	Project Manager: Darius Thompson	18-Apr-19 16:28

P3-MW01R-040919

1904071-05 (Water)

09-Apr-19 12:31

Analyte	Result	PQL	MDL	Units
Metals				
EPA 6020B	Prepared: 16-Apr-19 Analyzed: 16-Apr-19			
Arsenic, Dissolved	**1.58**	0.500	0.050	ug/L
Copper, Dissolved	**3.09**	0.500	0.022	ug/L
Lead, Dissolved	0.0061 U	0.500	0.0061	ug/L
Nickel, Dissolved	**1.11**	0.500	0.012	ug/L
Zinc, Dissolved	**2.77**	0.50	0.22	ug/L

PW Engineering	Project: **Foss Upland Esplanade**	
747 Market Street, Rm 744	Project Number: PWK-00423-01-01	**Reported:**
Tacoma WA, 98402	Project Manager: Darius Thompson	18-Apr-19 16:28

LANDAU-040919

1904071-06 (Water)

09-Apr-19 15:40

Analyte	Result	PQL	MDL	Units
Metals				
EPA 6020B	Prepared: 16-Apr-19 Analyzed: 16-Apr-19			
Arsenic, Dissolved	**5.73**	0.500	0.050	ug/L
Copper, Dissolved	**0.529**	0.500	0.022	ug/L
Lead, Dissolved	0.0061 U	0.500	0.0061	ug/L
Nickel, Dissolved	**2.83**	0.500	0.012	ug/L
Zinc, Dissolved	**2.41**	0.50	0.22	ug/L

Metals - Quality Control

Environmental Services Laboratory

Sample ID / Analyte	Result	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B915083 - EPA 6020B										
Blank (B915083-BLK1)				Prepared & Analyzed: 16-Apr-19						
B915083-BLK1										
Arsenic, Dissolved	0.050 U	0.050	ug/L							
Copper, Dissolved	0.022 U	0.022	ug/L							
Lead, Dissolved	0.0061 U	0.0061	ug/L							
Nickel, Dissolved	0.012 U	0.012	ug/L							
Zinc, Dissolved	0.22 U	0.22	ug/L							
Duplicate (B915083-DUP1)		Source: 1904071-01		Prepared & Analyzed: 16-Apr-19						
B915083-DUP1										
Arsenic, Dissolved	2.54	0.050	ug/L		2.52			0.8	20	
Copper, Dissolved	0.235 J	0.022	ug/L		0.249			6	20	
Lead, Dissolved	0.161 J	0.0061	ug/L		0.169			5	20	
Nickel, Dissolved	0.364 J	0.012	ug/L		0.411			12	20	
Zinc, Dissolved	1.82	0.22	ug/L		1.85			2	20	
LCS (B915083-BS1)				Prepared & Analyzed: 16-Apr-19						
B915083-BS1										
Arsenic, Dissolved	49.5	0.050	ug/L	50.0		99	80-120		200	
Copper, Dissolved	122	0.022	ug/L	125		97	80-120		200	
Lead, Dissolved	14.8	0.0061	ug/L	15.0		99	80-120		200	
Nickel, Dissolved	198	0.012	ug/L	200		99	80-120		200	
Zinc, Dissolved	99.2	0.22	ug/L	100		99	80-120		200	
Matrix Spike (B915083-MS1)		Source: 1904071-01		Prepared & Analyzed: 16-Apr-19						
B915083-MS1										
Arsenic, Dissolved	98.2	0.050	ug/L	100	2.52	96	70-130		20	
Copper, Dissolved	90.0	0.022	ug/L	100	0.249	90	70-130		20	
Lead, Dissolved	93.9	0.0061	ug/L	100	0.169	94	70-130		20	
Nickel, Dissolved	89.1	0.012	ug/L	100	0.411	89	70-130		20	
Zinc, Dissolved	95.9	0.22	ug/L	100	1.85	94	70-130		200	

PW Engineering	Project: **Foss Upland Esplanade**	
747 Market Street, Rm 744	Project Number: PWK-00423-01-01	**Reported:**
Tacoma WA, 98402	Project Manager: Darius Thompson	18-Apr-19 16:28

Notes and Definitions

U	Analyte Not Detected at or above the associated value
UJ	Analyte Not Detected at or above the associated estimated value
J	Analyte concentration is considered an estimated value
ND	Analyte NOT DETECTED at or above the reporting limit
E	Analyte was determined above the upper quantitation range of the method. The associated value is an estimate.
NJ	There is evidence the analyte is present. The associated value is an estimate.
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference

CHAIN OF CUSTODY

City of Tacoma Environmental Services
326 East D Street
Tacoma
WA, 98421-1801
phone (253) 502-2130
fax (253) 502-2170

Lab Work Order Number 1904071

Client Name: PW Engineering	Project Name: Foss Upland Esplanade
Client Contact: Darius Thompson	Project Number: PWK-00423-01-01
Address: 747 Market Street, Rm 744	Project Description: Foss Uplands Esplanade
City: Tacoma	PO Number: 61000073538
State/Zip: WA, 98402	Sampler Signatures: Rebecca Dozier RMZ 4/11/19
Phone: (253) 591-5395 / Fax: (253) 594-7941	
Samplers	

Requested Analyses: Zn; EPA 6020B: Dissolved As, Cu, Pb, Ni; Lab #

Requested Turn Around: Rush requests subject to additional charge. Rush requests subject to lab approval. Standard (days) | Expedited (days) | Due Date

Sample Name or Field ID #	Sampled Date	Sampled Time	Sample Type Code	Matrix Code	Container Count	Zn	EPA 6020B: Dissolved As, Cu, Pb, Ni	Lab #	Sample Comments
P3MW2-040919	4/9/19	14:55	G	W	1	1		-01	
MW5-040919	"	11:58	G	W	1	1		-02	
MW2-040919	"	14:30	G	W	1	1		-03	
P3-MW23-040919	"	13:45	G	W	1	1		-04	
P3-MW21R-040919	"	12:31	G	W	1	1		-05	
LandAV-040919	"	15:46	G	W	1	1		-06	

MJB 4-10-19

Relinquished By: Mike Shablin / [signature]	Received By: [signature]	Date/Time: 4/9/19 @16:00
Relinquished By	Received By	Date/Time
Relinquished By	Received By	Date/Time

Cooler Numbers and Temperatures

Comments: O Filter w/ 0.45 N.M filter & acidify upon receipt for all samples

Matrix Codes: W=Water

Preserv. Codes:

Login Reviewed By: MJB Date: 4.10.19