March 27, 2020

Darius Thompson
City of Tacoma
Public Works Department, Engineering Division
747 Market Street, Room 544
Tacoma, WA 98402-3769

Re: Groundwater Monitoring Results, January 2020
Thea Foss Waterway Esplanade, Thea Foss Upland
Tacoma, Washington
17646-03

Dear Mr. Thompson:

This letter transmits the results of the January 2020 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 approximately 3 hours of low tide in the adjacent Thea Foss Waterway, which occurred at 1:07 PM PST.

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 MW-5, P3-MW-01R, P3-MW-02, P3-MW-03, and the Landau Well exceeded the Model Toxics Control Act (MTCA) Method B cancer groundwater cleanup level for arsenic (0.058 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:
Table 1 – Water-Level Measurements
Table 2 – Analytical Results
Figure 1 – Vicinity Map
Figure 2 – Well Locations
Attachment 1 – Groundwater Sampling Field Forms
Attachment 2 – Data Quality Review & Laboratory Data Report

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Table 1 - Water-Level Measurements

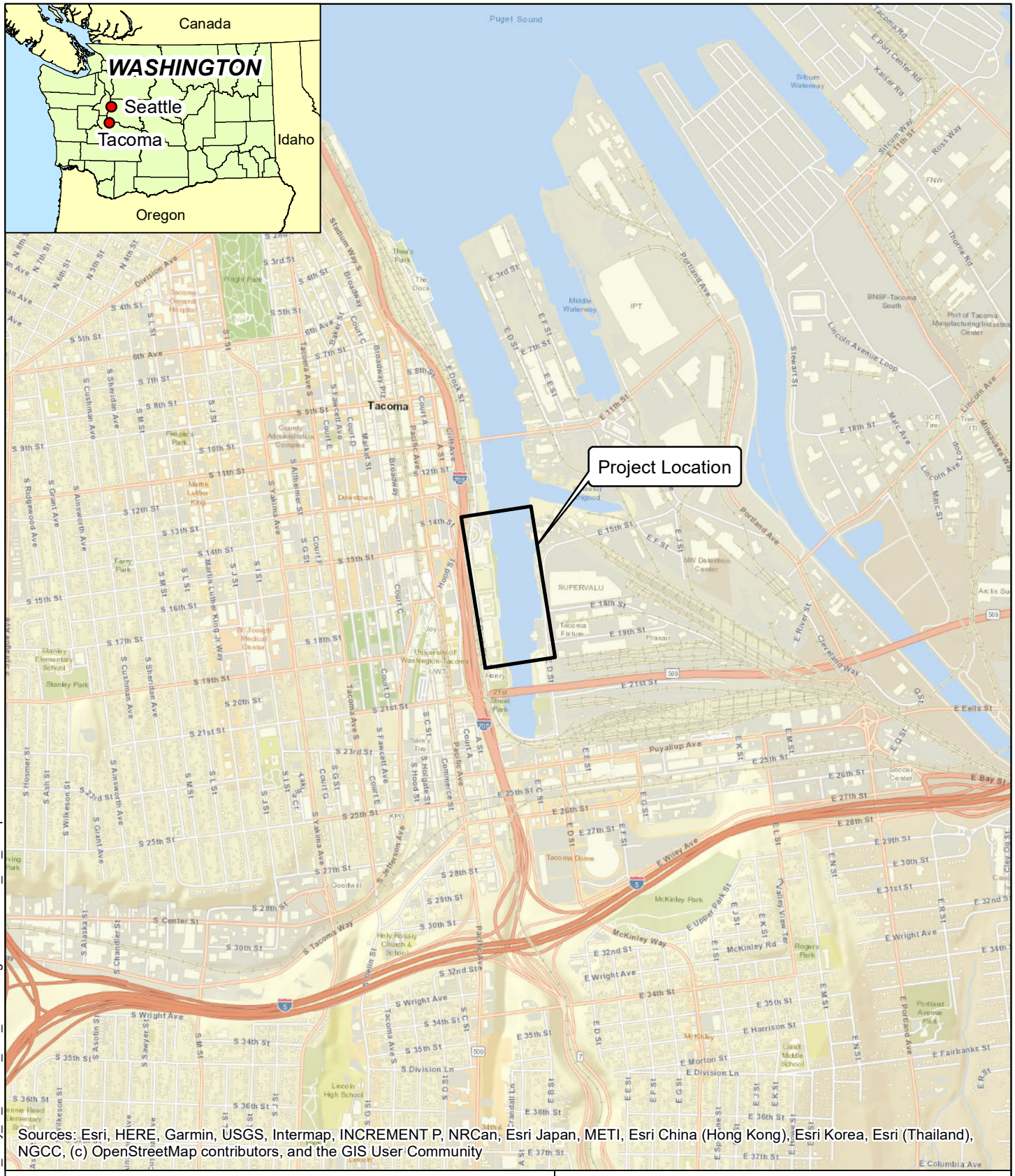
Well	Time	Depth to Water (feet)
MW-2	10:41 AM	10.72
MW-5	9:36 AM	8.64
P3-MW-01R	12:08 PM	7.12
P3-MW-02	2:15 PM	5.43
P3-MW-03	1:09 PM	7.94
Landau Well	2:50 PM	11.98

Notes:
Measurements taken on 1/27/2020
Depth to water measured from top of PVC well casings.

Table 2 - Analytical Results

Dissolved Metals in µg/L	Monitoring Well						Regulatory Levels			
							Groundwater Cleanup Levels, Cleanup Levels and Risk Calculation (CLARC)		Surface Water Standards for Marine Waters, Chapter 173-201A WAC	
	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	0.5 U	*0.615*	*1.56*	*4.33*	*1.76*	*0.68*	5 [a]	0.058	36	10
Copper	0.5 U	0.5 U	1.51	0.5 U	1.6	0.5 U	-	640 [b]	3.1	-
Lead	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	15	-	8.1	-
Nickel	0.566	0.538	0.829	0.5 U	0.544	0.595	-	-	8.2	190
Zinc	1.78	0.58	1.26	0.5 U	0.5	0.81	-	4800 [b]	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 1/27/2020.
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.
[b] Groundwater Method B Non-cancer cleanup level



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

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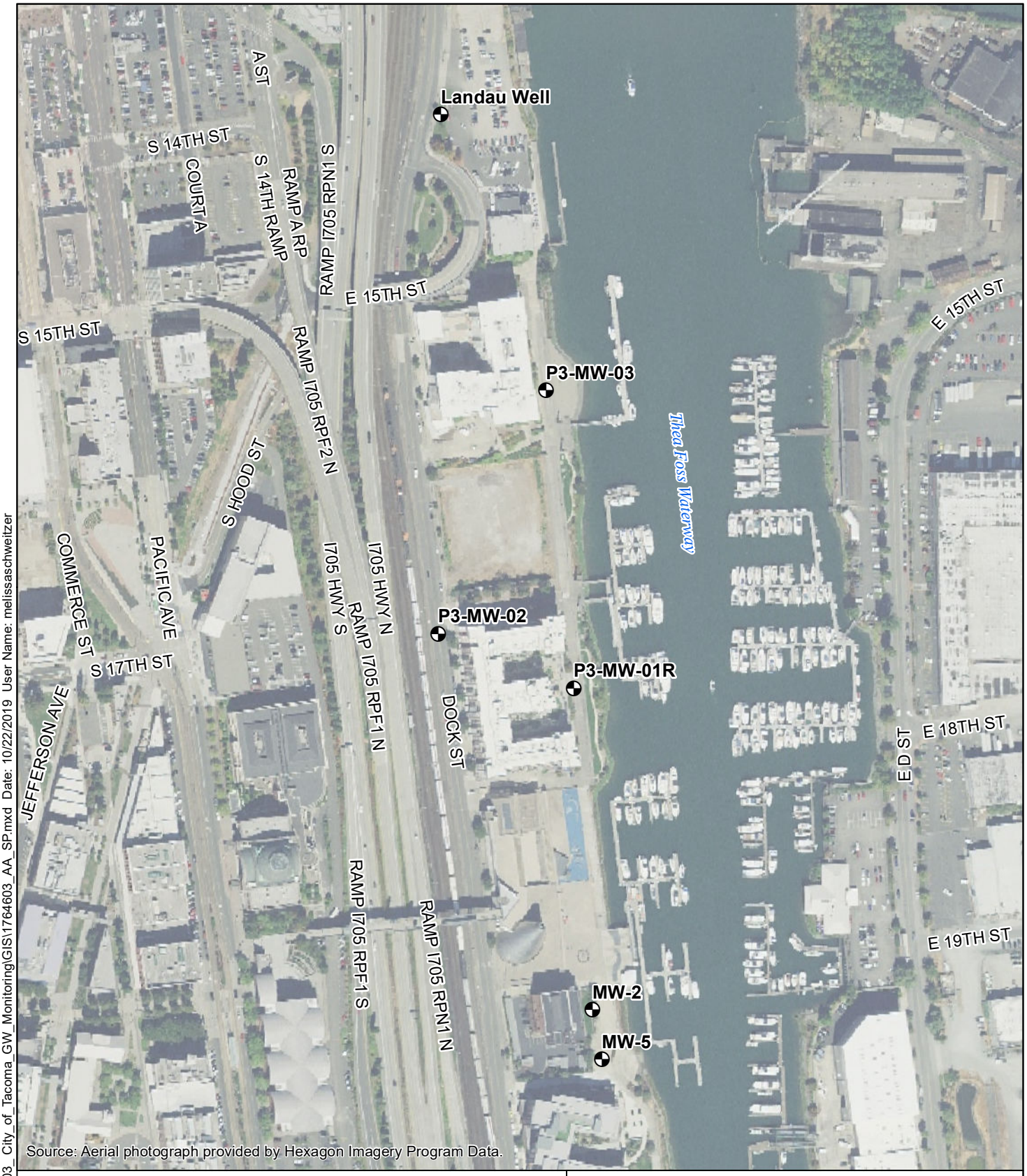

Source: Aerial photograph provided by Hexagon Imagery Program Data.

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

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ATTACHMENT 1
Groundwater Sampling Field Forms

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

Project: Thea Foss Waterway Esplanade
Job No.: 17646-03
Project Manager: Mark Dagel
Field Reps.: B. Dozier / J Higgins

Date/Time Sampled: 11/27/2020 0956
Tidally Influenced: Yes [X] No [ ]
Well Depth in Feet: 20
Screened Interval in Feet: 10-20?

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

Well Depth: 20.82'
Depth of Sediment (DTS) in Feet: 20.82'
Depth of Water (DTW) in Feet: 8.64'
(DTS - DTW): 12.18'

Casing Volume in Gallons: 1.99
[2" diameter = x 0.163 gal/ft]
Purge Volume in Gallons: 5.96
Actual Purge in Gallons: 2.5

SMPL

Time	No. of Gallons Purged	pH	Temp in °C	Conduct in mS/cm	Diss Oxygen in mg/L	Turbidity in NTU	ORP in mV	Comments: Quality, Recovery Color, Odor, Sheen, Accumulated Silt/Sand
9:36	0.5	6.59	12.6	1.01	0.51	9.55	-93.6	Clear, NS, strong sulfur odor
9:41	1	6.56	12.4	1.011	0.20	9.10	-105.6	same as above
9:50	2	7.0	12.5	0.997	0.09	9.06	-111.0	same as above
9:55	2.5	7.1	12.6	1.001	0.05	7.24	-111.9	same as above
9:56	2.5	6.54	12.6	1.004	0.05	6.62	-111.8	same as above

Comments

	Method	Purging Rate in GPM	Depth of Equipment in Feet
Purge	Peristaltic	<0.1	15'
Sample	Peristaltic	"	"

Bails dry? Yes [ ] No [X]
At no. of Casing Volumes: —
Purge Water Disposal Method/Volume: drum on site

2) Sampling Data

Bottle Type	No of Containers	Analyses	Perserv.	Filter
poly	1	Metals	N/A	N/A

Total Number of Bottles: 01
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: Peristaltic / PE
Bailer Type: —
Filter Type: —

Temp/pH/E.C./D.O: YSI Pro DSS
Water Level Probe: waterline
Other: —

4) Well Conditions

OK [X] Not OK [ ] Explain

Groundwater Sampling Data - Well I.D. MW-2 11:15

Project	Thea Foss Waterway Esplanade	Date/Time Sampled	1/27/2020
Job No.	1764603	Tidally Influenced	Yes [X] No [ ]
Project Manager	M. Dagel	Well Depth in Feet	26'
Field Reps.	B. Dozier + J. Higgins	Screened Interval in Feet	15-25?

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

Well Depth	26'	Casing Volume in Gallons	2.49
Depth of Sediment (DTS) in Feet	25.97'	[2" diameter = x 0.163 gal/ft]	
Depth of Water (DTW) in Feet	10.72'	Purge Volume in Gallons	7.46
(DTS - DTW)	15.25	Actual Purge in Gallons	3.6

Time	No. of Gallons Purged	pH	Temp in °C	Conduct in mS/cm	Diss Oxygen in mg/L	Turbidity in NTU	ORP in mV	Comments: Quality, Recovery Color, Odor, Sheen, Accumulated Silt/Sand
10:41	1	7.03	13.4	1.961	1.81	19.77	-67.5	Clear, NS, strong sulfur odor
10:51	2	6.61	13.4	1.557	0.17	33.30	-74.7	same as above
11:07	3	6.51	13.5	1.433	0.09	24.10	-67.2	same as above
11:13	3.5	6.51	13.6	1.515	0.07	16.98	-72.1	same as above, slight sulfur odor
SMPL 11:15	3.6	6.52	13.6	1.533	0.06	15.86	-72.8	same as above

Comments

	Method	Purging Rate in GPM	Depth of Equipment in Feet
Purge	Peristaltic	<0.1	~20
Sample	Peristaltic	"	"

Bails dry? Yes [ ] No [X]

At no. of Casing Volumes —

Purge Water Disposal Method/Volume drum on site

2) Sampling Data

Bottle Type	No of Containers	Analyses	Perserv.	Filter
poly	1	Metals	N/A	N/A

Total Number of Bottles ea 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	Peristaltic/PE	Temp/pH/E.C./D.O	YSI PRO DSS
Bailer Type	—	Water Level Probe	waterline
Filter Type	—	Other	—

4) Well Conditions

OK [ ] Not OK [X] Explain puddle over monument (inverted), bottom not flooded

Groundwater Sampling Data - Well I.D. P3-MW-01R 1220

Project	1764603	Date/Time Sampled	1/27/2020
Job No.	Foss Waterway Esplanade	Tidally Influenced	Yes [X] No [ ]
Project Manager	M. Doegel	Well Depth in Feet	~10.76
Field Reps.	B. Dozier + J. Higgins	Screened Interval in Feet	5-10?

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

Well Depth	~10.76	Casing Volume in Gallons	0.59
Depth of Sediment (DTS) in Feet	10.76'	[2" diameter = x 0.163 gal/ft]	
Depth of Water (DTW) in Feet	7.12'	Purge Volume in Gallons	1.78
(DTS - DTW)	3.64	Actual Purge in Gallons	1.6

Time	No. of Gallons Purged	pH	Temp in °C	Conduct in mS/cm	Diss Oxygen in mg/L	Turbidity in NTU	ORP in mV	Comments: Quality, Recovery Color, Odor, Sheen, Accumulated Silt/Sand
1208	0.5	7.25	11.8	0.962	6.09	7.03	95.3	NS, NO, clear
1213	1	7.07	11.7	0.960	5.96	15.96	104.0	Clear, NO, NS
1218	1.5	7.01	11.7	0.958	5.96	21.07	108.6	same as above
SMPL 1220	1.6	6.99	11.6	0.959	5.96	27.61	111.2	same as above

Comments

	Method	Purging Rate in GPM	Depth of Equipment in Feet
Purge	Peristaltic	0.1	~5
Sample	Peristaltic	0.1	5

Bails dry? Yes [ ] No [X]

At no. of Casing Volumes —

Purge Water Disposal Method/Volume drum on site

2) Sampling Data

Bottle Type	No of Containers	Analyses	Perserv.	Filter
poly	1	Metals	N/A	N/A

Total Number of Bottles ~~0~~ 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	Peristaltic / PE	Temp/pH/E.C./D.O	YSI Pro DSS
Bailer Type	—	Water Level Probe	weterline
Filter Type		Other	—

4) Well Conditions

OK [ ] Not OK [X] Explain Missing 2/3 bolts the one bolt is stripped, monument flooded; seal broken

Groundwater Sampling Data - Well I.D. P3-MW-03 1320

Project	Foss Esplanade	Date/Time Sampled	1/27/20
Job No.	1764603	Tidally Influenced	Yes [X] No [ ]
Project Manager	M. Degel	Well Depth in Feet	~10.46
Field Reps.	B. Dobert + J. Higgins	Screened Interval in Feet	5-10?

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

Well Depth	~10.46	Casing Volume in Gallons	0.41
Depth of Sediment (DTS) in Feet	10.46	[2" diameter = x 0.163 gal/ft]	
Depth of Water (DTW) in Feet	7.94	Purge Volume in Gallons	1.24
(DTS - DTW)	2.54	Actual Purge in Gallons	1.5

Time	No. of Gallons Purged	pH	Temp in °C	Conduct in mS/cm	Diss Oxygen in mg/L	Turbidity in NTU	ORP in mV	Comments: Quality, Recovery Color, Odor, Sheen, Accumulated Silt/Sand
1309	0.5	7.26	10.4	0.484	6.84	5.53	126.0	clear, NO, NS
1313	1	7.06	10.4	0.485	6.80	9.61	129.6	same as above
1315	1.25	7.03	10.3	0.484	6.80	13.26	131.3	"
SMPL 1320	1.5	6.99	10.3	0.485	6.79	16.72	133.4	"

Comments

	Method	Purging Rate in GPM	Depth of Equipment in Feet
Purge	Peristaltic	~0.1	5'
Sample	Peristaltic	"	"

Bails dry? Yes [ ] No [X]

At no. of Casing Volumes —

Purge Water Disposal Method/Volume drum onsite

2) Sampling Data

Bottle Type	No of Containers	Analyses	Perserv.	Filter
poly	1	metals	N/A	N/A

Total Number of Bottles 7

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	Peristaltic / PE	Temp/pH/E.C./D.O	YSI Pro DSS
Bailer Type	—	Water Level Probe	Waterline
Filter Type	—	Other	—

4) Well Conditions

OK [X] Not OK [ ] Explain

Groundwater Sampling Data - Well I.D. P3-MW-02 1425

Project	Thea Foss Waterway Esplanade	Date/Time Sampled	1/27/2020
Job No.	17646-03	Tidally Influenced	Yes [X] No [ ]
Project Manager	Mark Dagel	Well Depth in Feet	~14.25
Field Reps.	JLH, BD	Screened Interval in Feet	5-15?

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

Well Depth	14.25	Casing Volume in Gallons	1.44
Depth of Sediment (DTS) in Feet	14.25	[2" diameter = x 0.163 gal/ft]	
Depth of Water (DTW) in Feet	5.43	Purge Volume in Gallons	4.33
(DTS - DTW)	8.85	Actual Purge in Gallons	1.25

	Time	No. of Gallons Purged	pH	Temp in °C	Conduct in mS/cm	Diss Oxygen in mg/L	Turbidity in NTU	ORP in mV	Comments: Quality, Recovery Color, Odor, Sheen, Accumulated Silt/Sand
	1415	.25	7.08	11.7	.337	1.07	22.26	-99.1	Strong sulfur odor, NS, clear
	1418	.5	6.93	11.7	.341	.53	17.60	-99.4	Strong sulfur odor, NS, clear
	1422	1	6.85	11.7	.357	.27	11.41	-103.0	NO, NS, clear
SMPL	1425	1.25	6.84	11.7	.367	.19	12.10	-105.0	NO, NS, clear

Comments well is in road!

	Method	Purging Rate in GPM	Depth of Equipment in Feet
Purge	Peristaltic	~0.1	~10
Sample	Peristaltic	"	"

Bails dry? Yes [ ] No [X]

At no. of Casing Volumes —

Purge Water Disposal Method/Volume drum onsite

2) Sampling Data

Bottle Type	No of Containers	Analyses	Perserv.	Filter
poly	1	diss. metals	No	No

Total Number of Bottles 01

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	Peristaltic / PE	Temp/pH/E.C./D.O	YSI Pro DSS
Bailer Type	—	Water Level Probe	waterline
Filter Type	—	Other	—

4) Well Conditions

OK [ ] Not OK [X] Explain Missing 3 Bolts, 1/3 ears broken well in rd

Groundwater Sampling Data - Well I.D. Landau Well 15:05

Project: Thea Foss Waterway Esplanade
Job No.: 17646-03
Project Manager: Mark Dagel
Field Reps.: JLH BD

Date/Time Sampled: 1/27/2020
Tidally Influenced: Yes [X] No [ ]
Well Depth in Feet: ~30.23
Screened Interval in Feet: ~20-30?

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

Well Depth: 30.23
Depth of Sediment (DTS) in Feet: ~~30.23~~
Depth of Water (DTW) in Feet: 11.98
(DTS - DTW): 18.25

Casing Volume in Gallons: 2.97
[2" diameter = x 0.163 gal/ft]
Purge Volume in Gallons: 8.92U
Actual Purge in Gallons: 1.1

Time	No. of Gallons Purged	pH	Temp in °C	Conduct in mS/cm	Diss Oxygen in mg/L	Turbidity in NTU	ORP in mV	Comments: Quality, Recovery Color, Odor, Sheen, Accumulated Silt/Sand
1450	.7	6.70	13.7	0.790	.92	101B	-73	initially turbid, brown color, strong petro odor, NSS
1456	.5	6.75	13.7	0.797	.39	5.35	-87.3	clear, petro. odor, NS
1503	1	6.81	13.2	0.805	.23	3.36	-91.2	clear, petro odor, NS
SMPL 1505	1.1	6.81	13.1	.806	.24	3.17	-91.1	clear, petro odor, NS

Comments: well is in road; very strong petro odor (persisted in bucket)

	Method	Purging Rate in GPM	Depth of Equipment in Feet
Purge	Peristaltic	<0.1	~25
Sample	Peristaltic	"	"

Bails dry? Yes [ ] No [X]
At no. of Casing Volumes: —
Purge Water Disposal Method/Volume: drum on site

2) Sampling Data

Bottle Type	No of Containers	Analyses	Perserv.	Filter
poly	1	Diss. Metals	NO	NO

Total Number of Bottles: ~~0~~ 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: Peristaltic / PE
Bailer Type: —
Filter Type: —

Temp/pH/E.C./D.O: YSI Pro DSS
Water Level Probe: water line
Other: —

4) Well Conditions

OK [ ] Not OK [X] Explain: Missing 3 bolts, 3/3 ears broken monument + cracked well in rd

ATTACHMENT 2
Data Quality Review & Laboratory Data Report

ATTACHMENT 2
CHEMICAL DATA QUALITY REVIEW AND LABORATORY REPORTS

Chemical Data Quality Review

Six groundwater samples were collected on January 27, 2020. The samples were submitted to the City of Tacoma's Environmental Services Laboratory in Tacoma, Washington, for chemical analyses. The results were reported as lab report 2001464.

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.

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, except for dissolved lead (RPD of 38% when limit is 20%), not qualified.

DATA QUALITY REVIEW			
Job Number:	1764603	**Review Date:**	2/5/2020
Project:	Foss Upland Esplanade	**Reviewer:**	Dozier
Laboratory:	City of Tacoma environmental Services	**Laboratory Job ID#:**	2001464
Sample ID Numbers:			
MW-5-01272020, MW-2-01272020, P3-MW-01R-01272020, P3-MW-3-01272020, P3-MW-02-01272020, LANDAU WELL-01272020			
Sample Receiving Discrepancies:			
Samples filtered at lab.			

DATA QUALITY REVIEW			
Job Number:	1764603	**Review Date:**	2/5/2020
Project:	Foss Upland Esplanade	**Reviewer:**	Dozier
Laboratory:	City of Tacoma	**Laboratory Job ID#:**	2001464
Analysis:	EPA 6020B – dissolved As, Cu, Pb, Ni, Zn	**Matrix:**	Water
Sample ID Numbers:			
MW-5-01272020, MW-2-01272020, P3-MW-01R-01272020, P3-MW-3-01272020, P3-MW-02-01272020, LANDAU WELL-01272020			
Sampling Date:	01/27/2020	**Extraction Date:**	1/29/2020
Analysis Date:	1/29/2020		
Holding Times and Reporting Limits:			
Acceptable			
Method, Trip, and Field Blanks:			
MD is ND			
Surrogates			
N/A			
LCS:			
In control			
Matrix Spike/Matrix Spike Duplicate (MS/MSD):			
In control			

Laboratory Duplicate:
RPD in control, except for lead (38% when limit is 20%).
SRM %:
N/A
Calibration Criteria:
NR
Qualification Summary:
Lead RPD outside of control limits (38% when limit is 20%). No qualifications.

Laboratory Reports

30 January 2020

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

Subject: Foss Upland Esplanade

Enclosed are the analytical results for samples collected 01/27/2020.

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

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	30-Jan-20 16:28

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled
MW-5-01272020 HC#7	2001464-01	Water	27-Jan-20 09:56
MW-2-01272020 HC#7	2001464-02	Water	27-Jan-20 11:15
P3-MW-01R-01272020 HC#7	2001464-03	Water	27-Jan-20 12:20
P3-MW-3-01272020 HC#7	2001464-04	Water	27-Jan-20 13:20
P3-MW-02-01272020 HC#7	2001464-05	Water	27-Jan-20 14:25
Landau Well-01272020 HC#7	2001464-06	Water	27-Jan-20 15:05

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 for Dissolved Metals

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.

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	30-Jan-20 16:28

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

Eric Bitten

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	30-Jan-20 16:28

Environmental Services Laboratory

MW-5-01272020 HC#7

2001464-01 (Water)

27-Jan-20 09:56

Analyte	Result		PQL	Units
Metals				
EPA 6020B_(7/14) Prepared: 29-Jan-20	Analyzed: 29-Jan-20			
Arsenic, Dissolved	**0.615**		**0.500**	**ug/L**
Copper, Dissolved	0.500	U	0.500	ug/L
Lead, Dissolved	0.500	U	0.500	ug/L
Nickel, Dissolved	**0.538**		**0.500**	**ug/L**
Zinc, Dissolved	**0.58**		**0.50**	**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	30-Jan-20 16:28

MW-2-01272020 HC#7

2001464-02 (Water)

27-Jan-20 11:15

Analyte	Result		PQL	Units
Metals				
EPA 6020B_(7/14) Prepared: 29-Jan-20	Analyzed: 29-Jan-20			
Arsenic, Dissolved	0.500	U	0.500	ug/L
Copper, Dissolved	0.500	U	0.500	ug/L
Lead, Dissolved	0.500	U	0.500	ug/L
Nickel, Dissolved	**0.566**		**0.500**	**ug/L**
Zinc, Dissolved	**1.78**		**0.50**	**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	30-Jan-20 16:28

P3-MW-01R-01272020 HC#7

2001464-03 (Water)

27-Jan-20 12:20

Analyte	Result		PQL	Units
Metals				
EPA 6020B_(7/14) Prepared: 29-Jan-20	Analyzed: 29-Jan-20			
Arsenic, Dissolved	**1.56**		**0.500**	**ug/L**
Copper, Dissolved	**1.51**		**0.500**	**ug/L**
Lead, Dissolved	0.500	U	0.500	ug/L
Nickel, Dissolved	**0.829**		**0.500**	**ug/L**
Zinc, Dissolved	**1.26**		**0.50**	**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	30-Jan-20 16:28

P3-MW-3-01272020 HC#7

2001464-04 (Water)

27-Jan-20 13:20

Analyte	Result		PQL	Units
Metals				
EPA 6020B_(7/14) Prepared: 29-Jan-20	Analyzed: 29-Jan-20			
Arsenic, Dissolved	**1.76**		**0.500**	**ug/L**
Copper, Dissolved	**1.60**		**0.500**	**ug/L**
Lead, Dissolved	0.500	U	0.500	ug/L
Nickel, Dissolved	**0.544**		**0.500**	**ug/L**
Zinc, Dissolved	**0.50**		**0.50**	**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	30-Jan-20 16:28

P3-MW-02-01272020 HC#7

2001464-05 (Water)

27-Jan-20 14:25

Analyte	Result		PQL	Units
Metals				
EPA 6020B_(7/14) Prepared: 29-Jan-20	Analyzed: 29-Jan-20			
Arsenic, Dissolved	**4.33**		**0.500**	**ug/L**
Copper, Dissolved	0.500	U	0.500	ug/L
Lead, Dissolved	0.500	U	0.500	ug/L
Nickel, Dissolved	0.500	U	0.500	ug/L
Zinc, Dissolved	0.50	U	0.50	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	30-Jan-20 16:28

Landau Well-01272020 HC#7

2001464-06 (Water)

27-Jan-20 15:05

Analyte	Result		PQL	Units
Metals				
EPA 6020B_(7/14) Prepared: 29-Jan-20	Analyzed: 29-Jan-20			
Arsenic, Dissolved	**0.680**		**0.500**	**ug/L**
Copper, Dissolved	0.500	U	0.500	ug/L
Lead, Dissolved	0.500	U	0.500	ug/L
Nickel, Dissolved	**0.595**		**0.500**	**ug/L**
Zinc, Dissolved	**0.81**		**0.50**	**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	30-Jan-20 16:28

Metals - Quality Control

Environmental Services Laboratory

Sample ID / Analyte	Result		MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B005049 - EPA 6020B_(7/14)											
Blank					Prepared & Analyzed: 29-Jan-20						
B005049-BLK1											
Arsenic, Dissolved	0.500	U	0.050	ug/L							
Copper, Dissolved	0.500	U	0.022	ug/L							
Lead, Dissolved	0.500	U	0.0061	ug/L							
Nickel, Dissolved	0.500	U	0.012	ug/L							
Zinc, Dissolved	0.50	U	0.22	ug/L							
Duplicate	**Source: 2001464-02**				Prepared & Analyzed: 29-Jan-20						
B005049-DUP1											
Arsenic, Dissolved	0.488		0.050	ug/L		0.464			5	20	
Copper, Dissolved	0.099		0.022	ug/L		0.106			6	20	
Lead, Dissolved	0.0271		0.0061	ug/L		0.0184			38	20	
Nickel, Dissolved	0.543		0.012	ug/L		0.566			4	20	
Zinc, Dissolved	1.85		0.22	ug/L		1.78			4	20	
LCS					Prepared & Analyzed: 29-Jan-20						
B005049-BS1											
Arsenic, Dissolved	9.48		0.050	ug/L	10.0		95	80-120		200	
Copper, Dissolved	24.3		0.022	ug/L	25.0		97	80-120		200	
Lead, Dissolved	2.92		0.0061	ug/L	3.00		97	80-120		200	
Nickel, Dissolved	38.7		0.012	ug/L	40.0		97	80-120		200	
Zinc, Dissolved	19.5		0.22	ug/L	20.0		97	80-120		200	
Matrix Spike	**Source: 2001464-02**				Prepared & Analyzed: 29-Jan-20						
B005049-MS1											
Arsenic, Dissolved	84.6		0.050	ug/L	100	0.464	84	70-130		20	
Copper, Dissolved	77.3		0.022	ug/L	100	0.106	77	70-130		20	
Lead, Dissolved	79.1		0.0061	ug/L	100	0.0184	79	70-130		20	
Nickel, Dissolved	77.5		0.012	ug/L	100	0.566	77	70-130		20	
Zinc, Dissolved	80.8		0.22	ug/L	100	1.78	79	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	30-Jan-20 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

Page 1 of 1

~~OnSite~~ BD
~~Environmental Inc.~~ BD
~~Analytical Laboratory Testing Services~~
~~14648 NE 95th Street • Redmond, WA 98052~~
~~Phone: (425) 883-3881 • www.onsite-env.com~~

City of Tacoma
326 E D St
Tacoma WA 98421

Laboratory Number: 2001464

Company: Hart Crowser
Project Number: 17646-03/PWL-0473-01-01
Project Name: Thea Foss Waterway Esplanade
Project Manager: Mark Doegel
Sampled by: Becca Doeker + Julie Higgins

Turnaround Request (in working days)

(Check One)

☐ Same Day ☐ 1 Day
☐ 2 Days ☐ 3 Days
☒ Standard ~~(7 Days)~~ 18 Days reviewed w/client NLC
☐ _____ (other)

Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	Number of Containers	NWTPH-HCID	NWTPH-Gx/BTEX	NWTPH-Gx	NWTPH-Dx (☐ Acid / SG Clean-up)	Volatiles 8260C	Halogenated Volatiles 8260C	EDB EPA 8011 (Waters Only)	Semivolatiles 8270D/SIM (with low-level PAHs)	PAHs 8270D/SIM (low-level)	PCBs 8082A	Organochlorine Pesticides 8081B	Organophosphorus Pesticides 8270D/SIM	Chlorinated Acid Herbicides 8151A	Total RCRA Metals	Total MTCA Metals	TCLP Metals	HEM (oil and grease) 1664A	Metals, Dissolved		Sample #		% Moisture
	MW-5_01272020	1/27/20	0956	H2O	1																		X		-01		
	~~MW-5_01~~ BD																										
	MW-2_01272020	1/27/20	11:15	H2O	X2	MC 1/27/20																	X		-02		
	P3-MW-01R_01272020	1/27/20	12:20	H2O	1																		X		-03		
	P3-MW-03_01272020	1/27/20	13:20	H2O	1																		X		-04		
	P3-MW-02-01272020	1/27/20	14:25	H2O	1																		X		-05		
	Landaw Well 01272020	1/27/20	15:05	H2O	1																		X		-06		

	Signature	Company	Date	Time
Relinquished		HC	1/27/20	15:25
Received		City of Tacoma	1/27/2020	15:25
Relinquished				
Received				
Relinquished				
Received				

Comments/Special Instructions

Analysis requested via email
Dissolved 6020B, As, Pb, Cu, Ni, Zn

Data Package: Standard ☐ Level III ☐ Level IV ☐

Chromatograms with final report ☐ Electronic Data Deliverables (EDDs) ☐

Reviewed/Date

Reviewed/Date