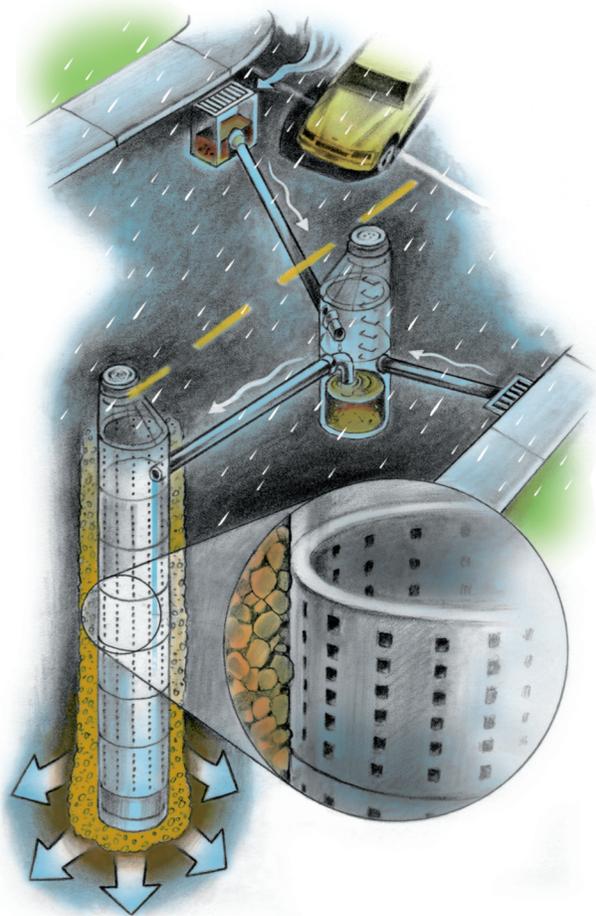


Annual Stormwater Discharge Monitoring Report

Year 4 (2015 Permit)

July 1, 2018 – June 30, 2019



Water Pollution
Control
Facilities (WPCF)
Permit

Class V Stormwater
Underground
Injection Control
Systems

Prepared by



ENVIRONMENTAL SERVICES
CITY OF PORTLAND
working for clean rivers

November 1, 2019

Appendix C
Year 4 (2015 Permit)
Stormwater Discharge Monitoring Data,
Shallow Groundwater UICs

(Laboratory reports and Excel spreadsheet
are provided on a separate CD)

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Appendix C

Year 4 (2015 Permit), Stormwater Discharge Monitoring Data, Shallow Groundwater UICs

This report presents the stormwater discharge monitoring data collected in Year 4 (July 1, 2018, to June 30, 2019) of the City of Portland (City) 2015 Water Pollution Control Facilities (WPCF) Permit No. 102830 for Class V Stormwater Underground Injection Control Systems (UICs). Year 4 (2015 Permit) sampling was performed in accordance with the City's 2015 *Stormwater Discharge Monitoring Plan* (SDMP). This report is divided into the following sections detailing the locations sampled and the final results from the laboratory analysis:

1. Introduction
2. Sampling Design
 - o Year 4 Monitoring Locations
 - o Chemical Analysis
3. Results, Exceedances, and Response Actions
4. Analytical Data Validation

As required in Schedule B.5 of the 2015 Permit, data provided in the analytical laboratory reports are included as Table 2. A CD of the laboratory reports and an Excel spreadsheet are also included.

Introduction

The City has prepared this report to be included as part of the UIC Management Plan annual report in compliance with Schedule B.5 its 2015 WPCF Permit.¹ The Oregon Department of Environmental Quality (DEQ) issued the City's second WPCF Permit Number 102830 in June 2015, which approved the City's required March 24, 2015, SDMP. The SDMP describes the stormwater monitoring strategy that the City will use throughout its second WPCF Permit term (June 2015 to May 2025) to evaluate stormwater discharges from public rights-of-way to City-owned UICs in areas of shallow groundwater.² Monitoring is conducted to demonstrate that the City's UIC Program protects beneficial uses of groundwater, meets WPCF Permit requirements, and satisfies requirements of the federal Safe Drinking Water Act and state UIC and groundwater regulations.

¹ The full name of the permit is the Water Pollution Facilities Permit for Class V Stormwater Underground Injection Control Systems.

² Areas of shallow groundwater refer to locations where UICs have < 5 feet of vertical separation distance between the bottom of the UIC and the seasonal high groundwater level. Seasonal high groundwater is discussed in Snyder's USGS Report 2008-5059, *Estimated Depth to Ground Water and Configuration of the Water Table in the Portland, Oregon, Area* (2008), <http://pubs.usgs.gov/sir/2008/5059>.

Sampling Design

To comply with the monitoring requirements of the 2015 Permit, the City implements a program to sample stormwater entering the City's UIC system from a subset of UICs located in areas of shallow groundwater and compare stormwater data to permit Action Levels.

There are approximately 120 UICs located in areas of shallow groundwater. Over the length of the 2015 Permit, a sample of 75 UICs will be selected from the list of UICs located in shallow groundwater. The 75 UICs will be broken up into five panels of 15 UICs each. Over the course of the 10-year permit, each panel will be sampled twice to achieve monitoring objectives in the SDMP. With a sample size of 75, approximately 61 percent of the UICs located in shallow groundwater will be sampled at the end of the 10-year period. A finite population correction³ will reduce the width of confidence intervals associated with this design by almost 50 percent, in comparison to a sample size of 75 UICs selected from a population of 10,000. This design therefore has the equivalent power of a much larger sample from the entire UIC population.

A Generalized Random Tessellation Stratified (GRTS) survey design⁴ will be used to select the 75 locations from the list of UICs in areas of shallow groundwater. A GRTS design will result in a random sample that is spatially balanced (i.e., a sample with a spatial distribution that is similar to the spatial distribution of the population).

The GRTS design also allows for simplifying the implementation of a sample design when some UICs are not suitable for sampling. A GRTS sample draw is an ordered list of sample locations that can be evaluated for sampling sequentially. The first 75 UICs on the list that are suitable for sampling are used as the sample, with sequential blocks of 15 UICs making up each of the five panels. For the purpose of choosing 75 UICs to sample, the entire population of UICs located in shallow groundwater areas was placed into random order using the R package *spsurvey*.⁵

Year 4 Monitoring Locations

Year 4 (2015 Permit) monitoring locations are 15 shallow groundwater sites developed in accordance with the SDMP (Table 1, Figure 1, and Figure 2, attached). On December 4, 2018, the City submitted to DEQ a letter that listed the 15 sites to be sampled. This letter explains why, based on presampling field inspections, 11 sites (SG-064, SG-067, SG-070, SG-074, SG-075, SG-076, SG-077, SG-084, SG-086, SG-088, and SG-089) were removed and replaced in accordance with 2015 Sampling and Analysis Plan procedures. During sampling, SG-082 could

³ When sampling more than approximately 5 percent of a finite population, a finite population correction is applied to the standard error of parameter estimates (e.g., annual trends, means, or population percentiles). This correction can significantly increase the precision of parameter estimates when a large proportion of the population is sampled (http://en.wikipedia.org/wiki/Standard_error#Correction_for_finite_population).

⁴ Stevens, D.L., Jr., and A.R. Olsen. 2004. "Spatially-balanced sampling of natural resources." *Journal of the American Statistical Association*. 99: 262–278. In collaboration with the U.S. Environmental Protection Agency, the City utilized the GRTS design to select its UIC stormwater monitoring program locations sampled for 2005 Permit compliance.

⁵ Kincaid, T. M. and A.R. Olsen. 2013. *spsurvey: Spatial Survey Design and Analysis*. R package version 2.6 (<http://www.epa.gov/nheerl/arm>).

not be sampled due to a plugged inlet. The location was replaced with SG-084, which was added back in after questions during initial inspections were resolved. SG-084 was originally going to be sampled in Year 5 but was sampled as part of Year 4. See Table 1 and Figures 1 and 2 for site specific information.

Chemical Analysis

As identified in Table 1 of the 2015 Permit, six pollutants are required to be sampled and analyzed for each monitoring location (Benzo[a]pyrene, Pentachlorophenol, Di(2-ethylhexyl)phthalate, total lead, total zinc, and total copper). The list of pollutants and sampling and analytical methods can be found in the SDMP. Monitoring results are summarized below.

Results, Exceedances, and Response Actions

The analytical results from the 15 shallow groundwater monitoring locations are attached in Table 2. All laboratory data sheets are included on a CD included with report. Review of the data indicated no Permit Table 1 Action Levels were exceeded, and thus no response actions were required. Collected data were also consistent with UIC monitoring that was conducted in the first WPCF Permit term.

Analytical Data Validation

Analytical results were reviewed to ensure that the data quality objectives defined in the Quality Assurance Project Plan were achieved, and they were determined to be acceptable and usable. A data usability report is attached.

Attachments:

- Table 1 - Year 4 (2015 Permit) UIC Monitoring Location Information
- Table 2 - Year 4 (2015 Permit) Monitoring Results
- Figures 1 and 2 - Year 4 (2015 Permit) UIC Monitoring Location Site Maps
- Data Usability Report
- CD containing lab data sheets and Microsoft Excel database

Table 1: Permit Required Monitoring Results (Year 4)

Site Id	Location Description	Street Type	Node	Analyte	Pentachlorophenol	DEHP	Benzo(a)pyrene	Copper	Lead	Zinc
				Action Level (ug/L)	10	300	2.0	1,300	500	50,000
				Method	EPA 515.4	SIM	EPA 8270-SIM	EPA 200.8	EPA 200.8	EPA 200.8
				Date						
SG-065	4745 SE 122ND AVE	Collector	AQT804	01/18/2019 13:25	0.421	35	0.086	34.0	11.1	281
SG-066	8318 SE 78TH AVE	Residential	ADV950	12/18/2018 08:57	0.106	0.71	<0.010	3.13	3.97	12.5
SG-068	13250 SE HOLGATE BLVD	Collector	ANA591	11/28/2018 09:34	1.21	6.9	0.057	15.9	8.98	96.9
SG-068	13250 SE HOLGATE BLVD	Collector	ANA591	11/28/2018 09:34	1.31	6.7	0.049	15.7	9.08	95.5
SG-069	12210 SE ELLIS ST	Collector	ADT686	11/28/2018 09:51	0.146	11	<0.033	12.8	3.80	59.3
SG-071	5404 SE 122ND AVE	Collector	AQT793	11/28/2018 11:19	0.386	16	0.038	16.7	5.90	99.1
SG-073	4857 SE 122ND AVE	Collector	AQT802	01/18/2019 13:49	0.440	15	0.058	22.0	6.13	205
SG-078	6457 NE 66TH AVE	Residential	AQT756	12/20/2018 10:25	0.115	1.3	0.029	31.2	54.6	179
SG-079	12204 SE STEELE ST	Collector	ADU751	11/28/2018 09:25	0.190	8.8	<0.033	11.4	4.77	61.8
SG-079	12204 SE STEELE ST	Collector	ADU751	11/28/2018 09:25	0.205	8.5	<0.033	11.1	4.60	59.4
SG-080	5608 SE 99TH AVE	Residential	ACP660	02/11/2019 11:01	2.34	0.80	<0.010	3.07	0.894	15.9
SG-081	11080 SE HAROLD ST	Collector	ADV191	02/11/2019 10:19	0.139	5.5	0.032	14.7	10.2	79.9
SG-083	10310 SE ELLIS ST	Residential	ADV188	11/27/2018 12:53	0.198	1.4	0.019	10.7	3.63	82.0
SG-084	4100 SE 133RD AVE	Collector	ADT466	02/11/2019 13:59	0.180	1.2	<0.010	3.46	1.55	13.8
SG-085	12506 SE REEDWAY ST	Residential	ADT691	11/28/2018 09:59	0.0540	0.69	<0.010	4.32	2.03	17.2
SG-087	5021 SE 122ND AVE	Collector	AQT798	01/18/2019 14:12	0.487	5.6	0.038	22.0	8.29	176
SG-090	13250 SE HOLGATE BLVD	Collector	ANA589	11/27/2018 10:31	1.45	2.5	0.029	9.39	8.72	48.9

Notes:

All concentrations in micrograms/per liter (ug/l).

Table 2: Year 4 (2015 Permit) UIC Monitoring Location Information

Location Code	Approximate Address ^a	Street Type	Predominant Land Use ^b	DEQ UIC ID	BES UIC ID ^c	Latitude	Longitude	UIC Depth (feet)	Pretreatment System ^d	Separation Distance ^e	Distance to Nearest Well (ft) ^f	Within Two-year Time of Travel from Public Drinking Water Well?
SG-065	4745 SE 122ND AVE	Collector	MFR	10102-9809	AQT804	45.48762	-122.53788	20	Sed MH	3	848	No
SG-066	8318 SE 78TH AVE	Residential	SFR	10102-4830	ADV950	45.46358	-122.58353	28	Sed MH	-13	1849	No
SG-068	13250 SE HOLGATE BLVD	Collector	MFR	10102-712	ANA591	45.48959	-122.52691	10	Sed MH	-1	1062	No
SG-069	12210 SE ELLIS ST	Collector	SFR	10102-5291	ADT686	45.48255	-122.53764	17	Sed MH	4	1268	No
SG-071	5404 SE 122ND AVE	Collector	COM	10102-9783	AQT793	45.48407	-122.53782	21	Sed MH	0	2538	No
SG-073	4857 SE 122ND AVE	Collector	SFR	10102-9807	AQT802	45.48687	-122.53791	20	Sed MH	2	877	No
SG-078	6457 NE 66TH AVE	Residential	SFR	10102-9785	AQT756	45.57010	-122.59515	26	Sed MH	-3	1070	No
SG-079	12204 SE STEELE ST	Collector	COM	10102-5931	ADU751	45.48472	-122.53757	20	Sed MH	0	1405	No
SG-080	5608 SE 99TH AVE	Residential	SFR	10102-5407	ACP660	45.48172	-122.56162	30	Sed MH	4	2534	No
SG-081	11080 SE HAROLD ST	Collector	SFR	10102-5468	ADV191	45.48280	-122.54931	23	Sed MH	-3	711	No
SG-084	4100 SE 133RD AVE	Residential	SFR	10102-6326	ADT466	45.49248	-122.52742	30	Sed MH	-1	1289	No
SG-083	10310 SE ELLIS ST	Collector	SFR	10102-5464	ADV188	45.48180	-122.55689	22	Sed MH	0	1322	No
SG-085	12506 SE REEDWAY ST	Residential	SFR	10102-5296	ADT691	45.48175	-122.53427	25	Sed MH	-4	2151	No
SG-087	5021 SE 122ND AVE	Collector	COM	10102-9803	AQT798	45.48546	-122.53795	17	Sed MH	4	1119	No
SG-090	13250 SE HOLGATE BLVD	Collector	MFR	10102-710	ANA589	45.48959	-122.52696	9	Sed MH	0	1054	No

Notes:

^a Addresses should not be considered precise location information and are subject to change as City staff better describe the physical UIC locations relative to nearby properties. UIC street addresses are assigned relative to nearby properties for general locating purposes. Latitude and longitude should be relied upon for accurately locating UICs.

^b COM = commercial; SFR = Single Family Residential; MFR = Multifamily Residential

^c BES UIC number is obtained from the BES Hansen database.

^d Sed MH = Sedimentation Manhole

^e The estimated separation distance is defined as the approximate depth in feet from the bottom-most perforation in the UIC to the approximate seasonal-high groundwater level. The bottom-most perforation is defined as the bottom of the UIC – 2 feet. Two feet were added to all separation distance calculations to account for the standard depth of the sediment trap ring on standard City UIC design. This information is reported to DEQ by the City as “Depth to groundwater” (UIC Database Report) for inclusion in DEQ’s UIC database. Reported to nearest foot. Separation distances are based on December 2008 USGS depth to groundwater data (Snyder, D.T., 2008, Estimated depth to ground water and configuration of the water table in the Portland, Oregon area: U.S. Geological Survey Scientific Investigations Report 2008-5095, 40p. (Available at <http://pubs.usgs.gov/sir/2008/5059>).

^f Horizontal distance to nearest groundwater drinking water well (e.g., municipal, domestic, irrigation).

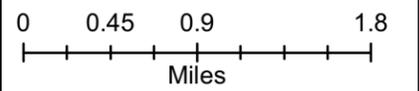
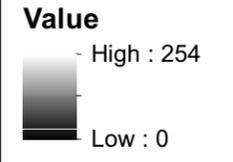
Figure 1

2018-19 (Year 14) UIC Monitoring Locations

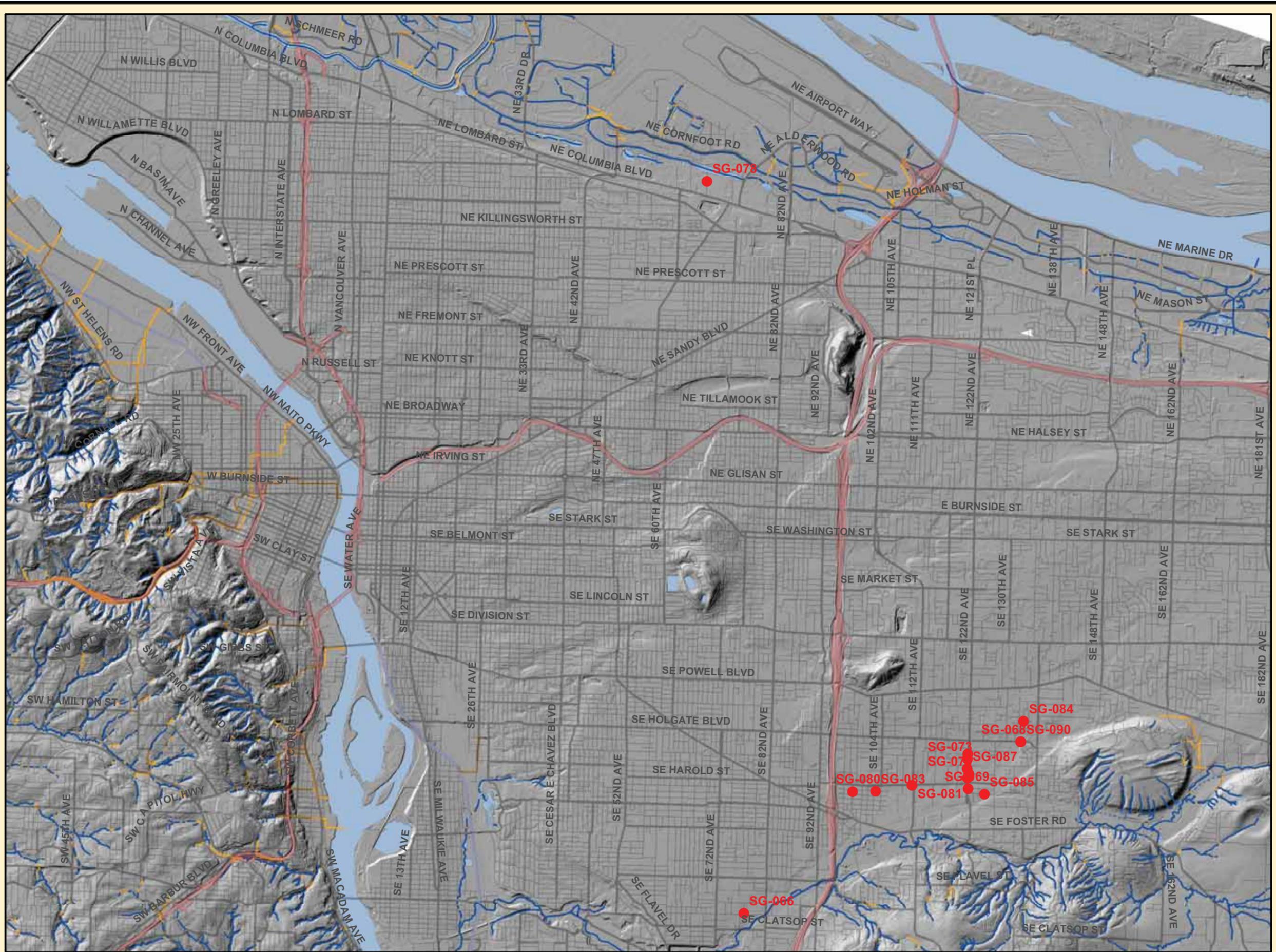
Explanation

- Shallow Groundwater Panel 4 (Event 1)

LiDAR DEM Hillshade



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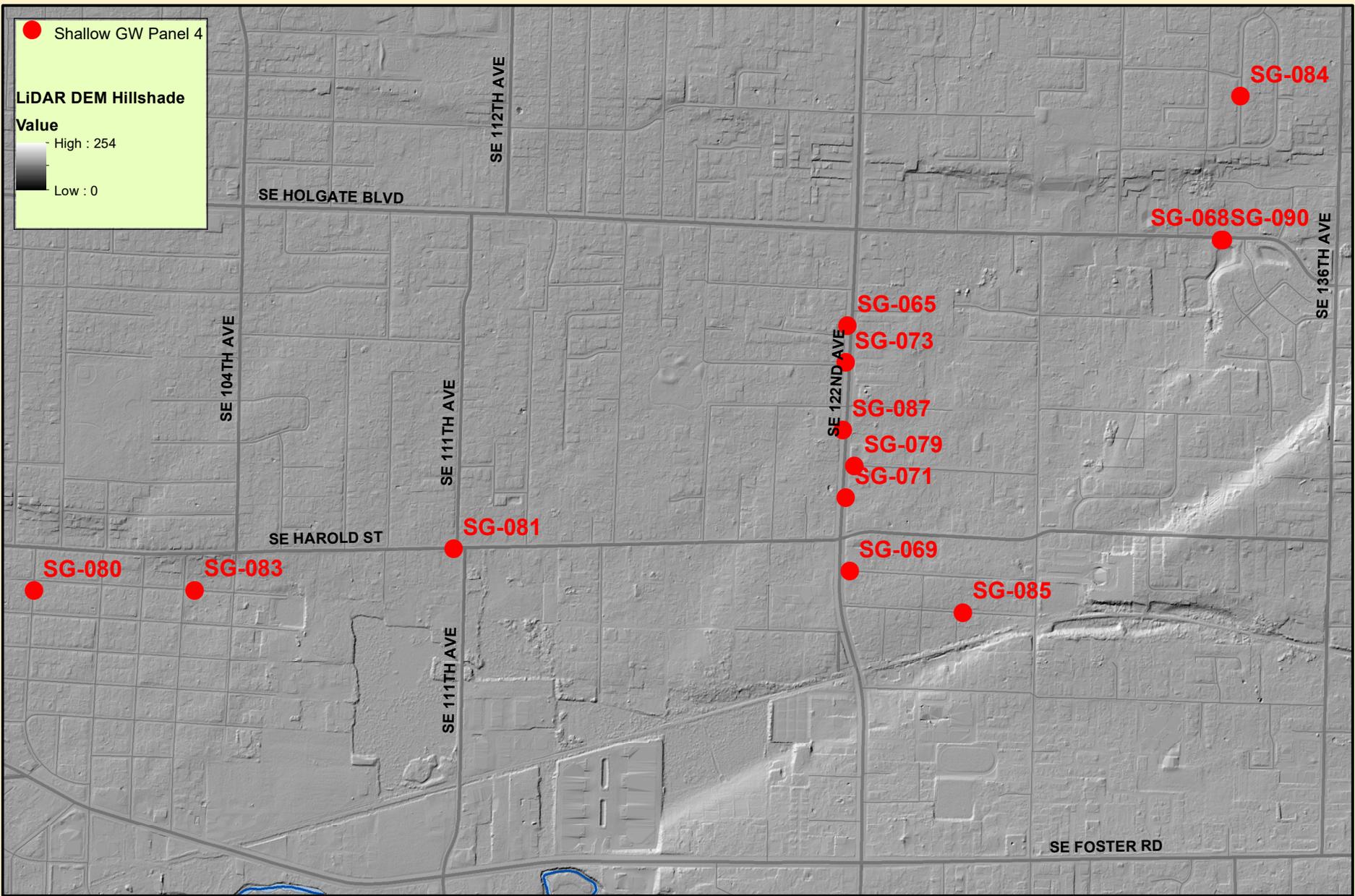


Figure 2
2018-19 (Year 14) UIC SE Monitoring Locations



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