

## Groundwater Application Review Summary Form

Application # G- 18798

GW Reviewer DENNIS ORLOWSKI

Date Review Completed: 7/31/2019

### Summary of GW Availability and Injury Review:

Groundwater for the proposed use is either over appropriated, will not likely be available in the amounts requested without injury to prior water rights, OR will not likely be available within the capacity of the groundwater resource per Section B of the attached review form.

### Summary of Potential for Substantial Interference Review:

There is the potential for substantial interference per Section C of the attached review form.

### Summary of Well Construction Assessment:

The well does not appear to meet current well construction standards per Section D of the attached review form. Route through Well Construction and Compliance Section.

*This is only a summary. Documentation is attached and should be read thoroughly to understand the basis for determinations and for conditions that may be necessary for a permit (if one is issued).*



PUBLIC INTEREST REVIEW FOR GROUNDWATER APPLICATIONS

TO: Water Rights Section Date 07/31/2019  
 FROM: Groundwater Section Dennis Orłowski  
 SUBJECT: Application G- 18798 Supersedes review of \_\_\_\_\_  
 Reviewer's Name  
 Date of Review(s)

**PUBLIC INTEREST PRESUMPTION; GROUNDWATER**

**OAR 690-310-130 (1)** *The Department shall presume that a proposed groundwater use will ensure the preservation of the public welfare, safety and health as described in ORS 537.525.* Department staff review groundwater applications under OAR 690-310-140 to determine whether the presumption is established. OAR 690-310-140 allows the proposed use be modified or conditioned to meet the presumption criteria. **This review is based upon available information and agency policies in place at the time of evaluation.**

**A. GENERAL INFORMATION:** Applicant's Name: Port of Portland County: Multnomah

A1. Applicant(s) seek(s) 10.03 cfs from 11 (see **Note 1** and **Note 2**) well(s) in the Willamette Basin, Columbia (partially – see **Note 3**) subbasin

A2. Proposed use Industrial/manufacturing Seasonality: Year-round

A3. Well and aquifer data (**attach and number logs for existing wells; mark proposed wells as such under logid**):

Well	Logid	Applicant's Well #	Proposed Aquifer*	Proposed Rate(cfs)	Location (T/R-S QQ-Q)	Location, metes and bounds, e.g. 2250' N, 1200' E fr NW cor S 36
1	Proposed (extraction)	EW-1	Alluvium	See Note 1	T1N/R2E-8	1730'S, 3110'E fr NW cor S8
2	Proposed (extraction)	EW-2	Alluvium	See Note 1	T1N/R2E-8	1880'S, 3385'E fr NW cor S8
3	Proposed (extraction)	EW-3	Alluvium	See Note 1	T1N/R2E-8	2480'N, 3455'E fr NW cor S8
4	Proposed (injection)	IW-1	Alluvium	See Note 1	T1N/R2E-9	2360'N, 100'E fr SW cor S9
5	Proposed (injection)	IW-2	Alluvium	See Note 1	T1N/R2E-9	2195'N, 490'E fr SW cor S9
6	Proposed (injection)	IW-3	Alluvium	See Note 1	T1N/R2E-9	2450'N, 590'E fr SW cor S9
7	Proposed (injection)	IW-4	Alluvium	See Note 1	T1N/R2E-9	2680'N, 705'E fr SW cor S9
8	Proposed (injection)	IW-5	Alluvium	See Note 1	T1N/R2E-9	2130'N, 1470'E fr SW cor S9
9	Proposed (injection)	IW-6	Alluvium	See Note 1	T1N/R2E-9	1765'N, 1350'E fr SW cor S9
10	Proposed (injection)	IW-7	Alluvium	See Note 1	T1N/R2E-9	1960'N, 1425'E fr SW cor S9
11	Proposed (injection)	IW-8	Alluvium	See Note 1	T1N/R2E-9	1623'N, 1485'E fr SW cor S9

\* Alluvium, CRB, Bedrock

Well	Well Elev ft msl	First Water ft bls	SWL ft bls	SWL Date	Well Depth (ft)	Seal Interval (ft)	Casing Intervals (ft)	Liner Intervals (ft)	Perforations Or Screens (ft)	Well Yield (gpm)	Draw Down (ft)	Test Type
1	20	TBD	TBD	TBD	500	0-405	0-405	--	400-500	TBD	TBD	TBD
2	15	TBD	TBD	TBD	500	0-405	0-405	--	400-500	TBD	TBD	TBD
3	17	TBD	TBD	TBD	500	0-405	0-405	--	400-500	TBD	TBD	TBD
4	15	TBD	TBD	TBD	500	0-405	0-405	--	400-500	TBD	TBD	TBD
5	12	TBD	TBD	TBD	500	0-405	0-405	--	400-500	TBD	TBD	TBD
6	12	TBD	TBD	TBD	500	0-405	0-405	--	400-500	TBD	TBD	TBD
7	15	TBD	TBD	TBD	500	0-405	0-405	--	400-500	TBD	TBD	TBD
8	15	TBD	TBD	TBD	500	0-405	0-405	--	400-500	TBD	TBD	TBD
9	17	TBD	TBD	TBD	500	0-405	0-405	--	400-500	TBD	TBD	TBD
10	15	TBD	TBD	TBD	500	0-405	0-405	--	400-500	TBD	TBD	TBD
11	17	TBD	TBD	TBD	500	0-405	0-405	--	400-500	TBD	TBD	TBD

Use data from application for proposed wells.

**A4. Comments:**

**Note 1:** this application is for the proposed installation and use of three extraction wells (EW-1 through EW-3) and eight injection wells (IW-1 through IW-8) that will be integral components of a planned open-loop ground source heat pump system for the Portland International Airport. Proposed construction details indicate that both types of wells are to be sealed through Confining Unit 1 (CU1), with screened sections open to the underlying Troutdale Sandstone Aquifer (TSA). The proposed seal and total depths for the wells are consistent with generally-estimated depths for both of those Portland Basin formations in this area (Morgan and McFarland, 1996; Swanson and others, 1993).

In regard to groundwater usage, the system will be mostly non-consumptive: groundwater will be pumped from the TSA via the extraction wells, circulated through the airport heating and cooling system, and then injected back into the TSA via injection wells (see attached location map). The requested 10.03 cfs (~4500 gpm) rate is the maximum cumulative pumping/circulation rate planned for the system. Distances between extraction and injection wells range from approximately

2200 to 4300 ft apart. After an initial period of use, a dynamic equilibrium will be established in the alluvial groundwater system between extraction and injection wells, i.e., it will form a non-consumptive, open-loop subsurface circulation system.

Some relatively-minor consumptive groundwater use will, however, be required for the system. The injection wells will require periodic back-flushing to maintain injection capacity; back-flushing will consist of conventionally pumping the wells and discharging the pumped water to waste. The applicant estimates that each of the eight injection wells will need to be pumped twice a month for up to 60 minutes each time, at approximately 800 gpm (~1.78 cfs) from each well. This equates to a total annual volume of 28.28 acre-feet. **These estimated consumptive use pumping rates and volumes were used for the groundwater availability and injury consideration portions of this review.**

**Note 2:** the original application presented two possible general well location layouts. On July 15, 2019 the applicant submitted finalized well locations which were the basis for this review (see attached well location map).

**Note 3:** the alluvial groundwater system in this area is hydraulically connected to both the mainstem Columbia River and to the Columbia Slough. Based only on relative proximity, all of the injection and extraction wells would likely be better connected to the mainstem Columbia River, which is not part of the Columbia Subbasin. The hydraulic connection to the Columbia Slough, which is part of Columbia Subbasin (OAR 690-502-0150), would be to a relatively-lesser extent.

- A5.  **Provisions of the** Willamette Basin rules relative to the development, classification and/or management of groundwater hydraulically connected to surface water  **are, or**  **are not**, activated by this application. (Not all basin rules contain such provisions.)

Comments: The proposed wells will obtain groundwater from a confined aquifer and will not be within ¼ mile of a surface water source, and thus the pertinent rule (OAR 690-502-0240) does not apply. Furthermore, this rule also generally does not apply as the vast majority of the extracted groundwater will be reinjected to the same aquifer (i.e., it is predominantly a non-consumptive proposed use).

- A6.  **Well(s) #** \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, tap(s) an aquifer limited by an administrative restriction.  
Name of administrative area: Not applicable.  
Comments:



**B. GROUNDWATER AVAILABILITY CONSIDERATIONS, OAR 690-310-130, 400-010, 410-0070**

B1. **Based upon available data**, I have determined that groundwater\* for the proposed use:

- a.  is over appropriated,  is not over appropriated, or  cannot be determined to be over appropriated during any period of the proposed use. \* This finding is limited to the groundwater portion of the over-appropriation determination as prescribed in OAR 690-310-130;
- b.  will not or  will likely be available in the amounts requested without injury to prior water rights. \* This finding is limited to the groundwater portion of the injury determination as prescribed in OAR 690-310-130;
- c.  will not or  will likely to be available within the capacity of the groundwater resource; or
- d.  will, if properly conditioned, avoid injury to existing groundwater rights or to the groundwater resource:
- i.  The permit should contain condition #(s) Large water-use reporting; 7L (underground injection);
  - ii.  The permit should be conditioned as indicated in item 2 below.
  - iii.  The permit should contain special condition(s) as indicated in item 3 below;

- B2. a.  **Condition** to allow groundwater production from no deeper than \_\_\_\_\_ ft. below land surface;
- b.  **Condition** to allow groundwater production from no shallower than \_\_\_\_\_ ft. below land surface;
- c.  **Condition** to allow groundwater production only from the Troutdale Sandstone Aquifer groundwater reservoir between approximately 400 ft. and 500 ft. below land surface;
- d.  **Well reconstruction** is necessary to accomplish one or more of the above conditions. The problems that are likely to occur with this use and without reconstructing are cited below. Without reconstruction, I recommend withholding issuance of the permit until evidence of well reconstruction is filed with the Department and approved by the Groundwater Section.

**Describe injury** –as related to water availability– that is likely to occur without well reconstruction (interference w/ senior water rights, not within the capacity of the resource, etc): \_\_\_\_\_

B3. **Groundwater availability remarks:** As noted previously in this review (Note 1, Section A4), the proposed groundwater use is primarily non-consumptive. The planned consumptive portion of the proposed use (periodic back-flushing of eight injection wells) is estimated to be 28.28 acre-feet annually.

Known existing groundwater uses near the proposed extraction and injection well locations are very limited. The proposed well/POA locations are generally within or near the boundary of the Portland International Airport, on or near tax lots registered to the Port of Portland (applicant). The nearest groundwater permits are those possessed by the applicant. The nearest non-Port properties (within approximately one mile) are primarily commercial and industrial entities that do not appear to possess groundwater rights, nor are there available well records for possibly exempt groundwater uses. The lack of significant groundwater exploitation in the area suggests that the potential for injury to existing uses is very low.

In this area the alluvial aquifer system, and the Troutdale Sandstone Aquifer in particular, are typically quite prolific. Sustainable well yields on the order of 2500 gpm have been reported for the TSA (Swanson and others, 1993). Significant recharge to the aquifer system is also afforded by its hydraulic connection with nearby surface water bodies. Despite the scarcity of relevant water-level data in this area, these aquifer characteristics suggest that groundwater will be available for the consumptive portion of this proposed use.

Despite the relatively-low consumptive use volume, the requested non-consumptive rate (10.03 cfs) is quite high. Thus large water-use reporting and 7L are recommended as permit conditions, as well as the following special condition:

- **Recommended special condition:** “All water produced under this permit, with the exception of water discharged solely for back-flushing of injection wells, is to be injected into the authorized injection wells. Prior to operation of the system, the permit holder is to submit documentation affirming that any applicable additional requirements of the Department’s Division 230 rules have been met, including submission and approval of an injection plan.”

(Note: a similar recommended special condition has been included in prior permits for similar use, e.g., permit G-16615)



**C. GROUNDWATER/SURFACE WATER CONSIDERATIONS, OAR 690-09-040**

C1. **690-09-040 (1):** Evaluation of aquifer confinement:

Well	Aquifer or Proposed Aquifer	Confined	Unconfined
1-11	Alluvium (Troutdale Sandstone Aquifer)	<input checked="" type="checkbox"/>	<input type="checkbox"/>

**Basis for aquifer confinement evaluation:** The preliminary design for the proposed extraction and injection wells indicate that all wells will be open to only the TSA, estimated to range from approximately 400 to 500 ft bgs in this area. The TSA is overlain by Confining Unit 1 (CU1), estimated to range from about 125 to 200 feet thick. CU-1 is in turn overlain by the Troutdale Gravel Aquifer (TGA) and the unconsolidated sedimentary aquifer (USA). This stratigraphic sequence, in particular the thick low-permeability silts and clays of CU-1, suggests that the TSA in this area is moderately to strongly confined.

C2. **690-09-040 (2) (3):** Evaluation of distance to, and hydraulic connection with, surface water sources. All wells located a horizontal distance less than ¼ mile from a surface water source that produce water from an unconfined aquifer shall be assumed to be hydraulically connected to the surface water source. Include in this table any streams located beyond one mile that are evaluated for PSI.

Well	SW #	Surface Water Name	GW Elev ft msl	SW Elev ft msl	Distance (ft)	Hydraulically Connected?			Potential for Subst. Interfer. Assumed?	
						YES	NO	ASSUMED	YES	NO
7	1	Columbia River (mainstem)	Est 10-20	5-10	1650	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
7	2	Columbia Slough	Est 10-20	5-10	5050	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

**Basis for aquifer hydraulic connection evaluation:** As discussed previously in Section A4 of this review, the consumptive use portion of this proposed use will be limited to periodic back-flushing of each injection well (at approximately 800 gpm (~1.78 cfs), for approximately 60 minutes twice per month). Given the relative proximity of the eight proposed injection well locations to each other, only the one nearest to the Columbia River (Well 7, "IW-4") was evaluated for PSI.

Available groundwater level data for the TSA in this area is extremely limited. The nearest TSA-only data appears to be from wells located about 3-4 miles to the southeast (MULT 1118 and MULT 1263), with the most recent measurements available to OWRD from 1989. In 1981 levels in MULT 1118 showed flowing artesian conditions; groundwater exploitation of Portland Basin aquifers has generally lowered levels since that time, with the best estimate of current levels shown in Table C2. These estimated groundwater elevations suggest hydraulic connection between the proposed wells and both the mainstem Columbia River and the Columbia Slough. However, this hydraulic connection is likely greatly attenuated due to the estimated depth (400-500 ft bgs) of the TSA in this area, and in particular the presence of CU-1.

**Water Availability Basin the well(s) are located within:** None

C3a. **690-09-040 (4):** Evaluation of stream impacts for each well that has been determined or assumed to be **hydraulically connected and less than 1 mile** from a surface water source. Limit evaluation to instream rights and minimum stream flows that are pertinent to that surface water source, and not lower SW sources to which the stream under evaluation is tributary. Compare the requested rate against the 1% of 80% natural flow for the pertinent Water Availability Basin (WAB). If Q is not distributed by well, use full rate for each well. Any checked  box indicates the well is assumed to have the potential to cause PSI.

Well	SW #	Well < ¼ mile?	Qw > 5 cfs?	Instream Water Right ID	Instream Water Right Q (cfs)	Qw > 1% ISWR?	80% Natural Flow (cfs)	Qw > 1% of 80% Natural Flow?	Interference @ 30 days (%)	Potential for Subst. Interfer. Assumed?
7	1	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>
7	2	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>

C3b. **690-09-040 (4):** Evaluation of stream impacts by total appropriation for all wells determined or assumed to be **hydraulically connected and less than 1 mile** from a surface water source. **Complete only if Q is distributed among wells.** Otherwise same evaluation and limitations apply as in C3a above.

Well	SW #	Well < ¼ mile?	Qw > 5 cfs?	Instream Water Right ID	Instream Water Right Q (cfs)	Qw > 1% ISWR?	80% Natural Flow (cfs)	Qw > 1% of 80% Natural Flow?	Interference @ 30 days (%)	Potential for Subst. Interfer. Assumed?
			<input type="checkbox"/>			<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>

**Comments:** Neither SW1 (Columbia River) or SW2 (Columbia Slough) are associated with an OWRD WAB, and thus a Division 9 evaluation is not applicable.

C4a. **690-09-040 (5):** Estimated impacts on **hydraulically connected surface water sources greater than one mile** as a percentage of the proposed pumping rate. Limit evaluation to the effects that will occur up to one year after pumping begins. This table encompasses the considerations required by 09-040 (5)(a), (b), (c) and (d), which are not included on this form. Use additional sheets if calculated flows from more than one WAB are required.

Non-Distributed Wells													
Well	SW#	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
		%	%	%	%	%	%	%	%	%	%	%	%
Well Q as CFS													
Interference CFS													
Distributed Wells													
Well	SW#	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
		%	%	%	%	%	%	%	%	%	%	%	%
Well Q as CFS													
Interference CFS													
(A) = Total Interf.													
(B) = 80 % Nat. Q													
(C) = 1 % Nat. Q													
(D) = (A) > (C)		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
(E) = (A / B) x 100		%	%	%	%	%	%	%	%	%	%	%	%

(A) = total interference as CFS; (B) = WAB calculated natural flow at 80% exceed. as CFS; (C) = 1% of calculated natural flow at 80% exceed. as CFS; (D) = highlight the checkmark for each month where (A) is greater than (C); (E) = total interference divided by 80% flow as percentage.

**Basis for impact evaluation:** Not applicable.

C4b. **690-09-040 (5) (b)** The potential to impair or detrimentally affect the public interest is to be determined by the Water Rights Section.

C5.  **If properly conditioned**, the surface water source(s) can be adequately protected from interference, and/or groundwater use under this permit can be regulated if it is found to substantially interfere with surface water:

- i.  The permit should contain condition #(s) \_\_\_\_\_;
- ii.  The permit should contain special condition(s) as indicated in "Remarks" below;

C6. **SW / GW Remarks and Conditions:** None

**References Used:** Application G-18798 file

Morgan, D.S., and McFarland, W.D., 1996, Simulation analysis of the ground-water flow system in the Portland Basin, Oregon and Washington: U.S. Geological Survey Water-Supply Paper 2470-B, 83 p.

Swanson, R.D., McFarland, W.D., Gonthier, J.B., and Wilkinson, J.M., 193, A description of hydrogeologic units in the Portland basin, Oregon and Washington: U.S. Geological Survey Water-Resources Investigations Report 90-4196, 56p.



**D. WELL CONSTRUCTION, OAR 690-200**

D1. **Well #:** \_\_\_\_\_ **Logid:** \_\_\_\_\_

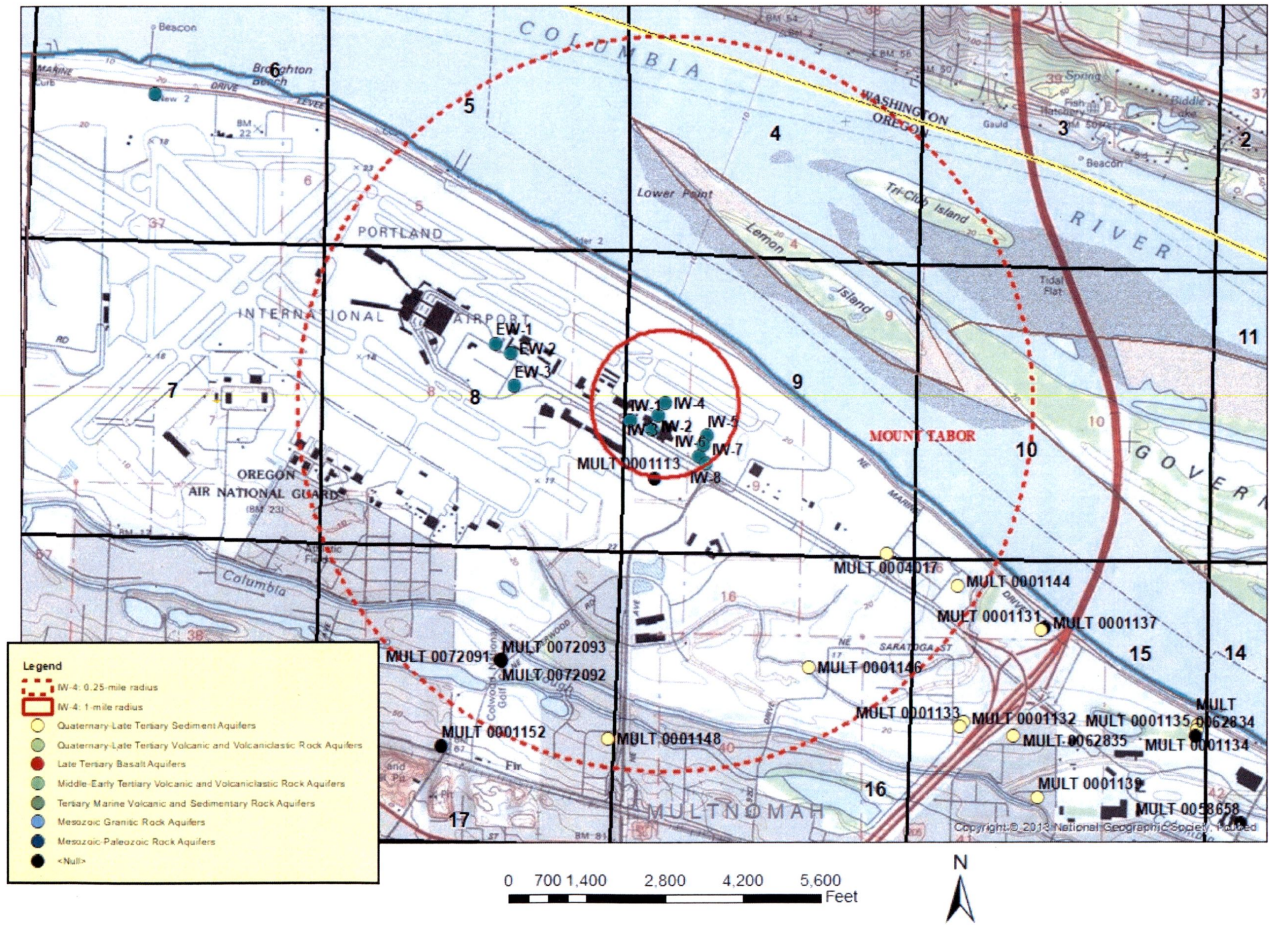
D2. **THE WELL does not appear to meet current well construction standards based upon:**

- a.  review of the well log;
- b.  field inspection by \_\_\_\_\_;
- c.  report of CWRE \_\_\_\_\_;
- d.  other: (specify) \_\_\_\_\_

D3. **THE WELL construction deficiency or other comment is described as follows:** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

D4.  **Route to the Well Construction and Compliance Section for a review of existing well construction.**

### Application G-18798 Port of Portland





Water-Level Trends in Nearby Wells

