

Appendix A Only
INTEGRATED SCIENTIFIC ASSESSMENT
REPORT

VANCOUVER WATERSHED HEALTH ASSESSMENT

Prepared for
City of Vancouver, Washington

Prepared by
Herrera Environmental Consultants, Inc.
and
Pacific Groundwater Group



Note:

Some pages in this document have been purposely skipped or blank pages inserted so this document will copy correctly when duplexed.

Appendix A Only
INTEGRATED SCIENTIFIC ASSESSMENT
REPORT

VANCOUVER WATERSHED HEALTH ASSESSMENT

Prepared for
City of Vancouver Surface Water Management
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February 20, 2019

APPENDIX A

PGG Figures

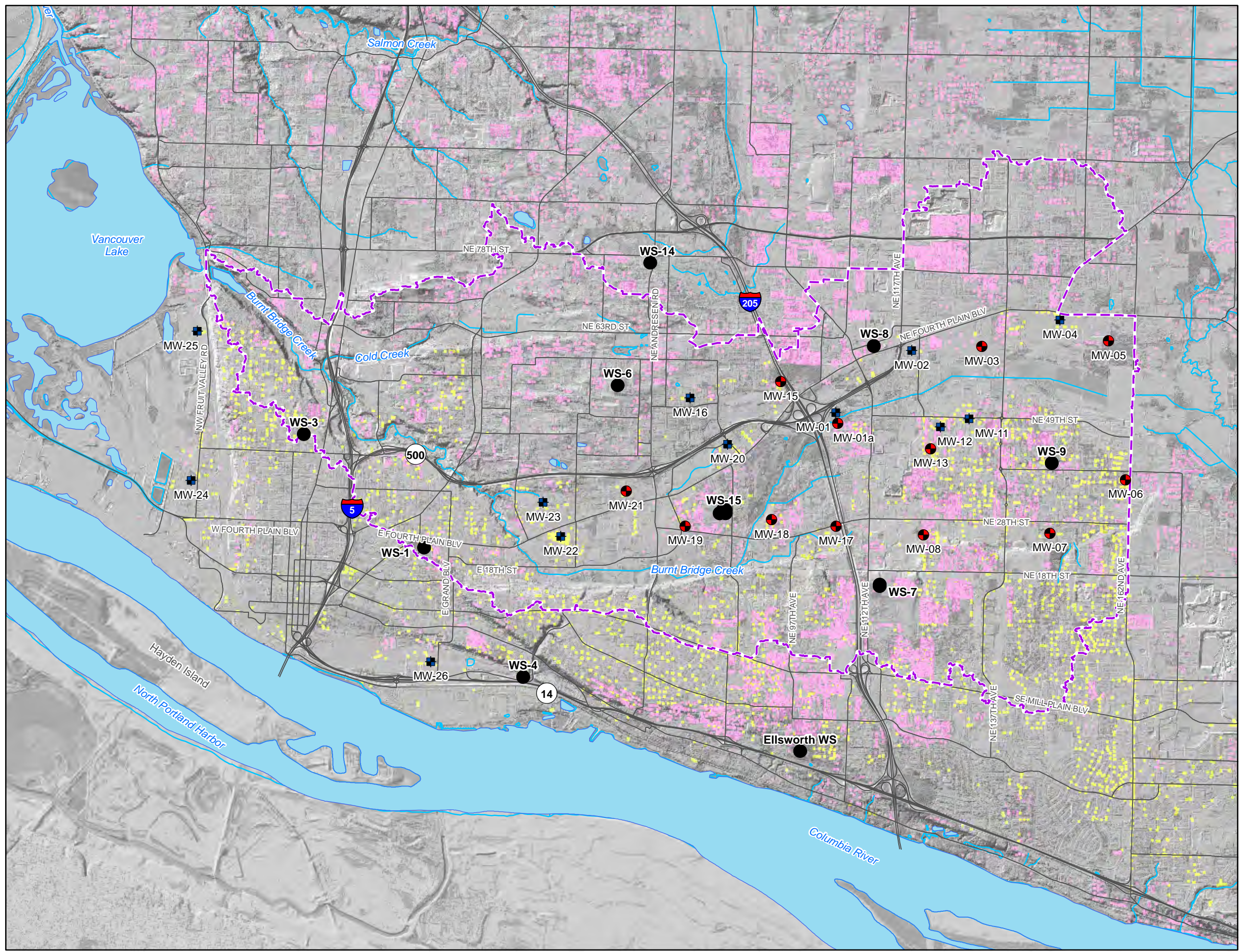


Figure PGG-1.
Groundwater Quality
Sample Locations

Legend

- Project Monitoring Wells**
- Water Level and Water Quality Monitoring
 - Water Level Monitoring Only
 - Vancouver Water Stations
- BBC Basin
- Septic Systems
- Drywells



0 2,500 5,000 10,000
 Feet



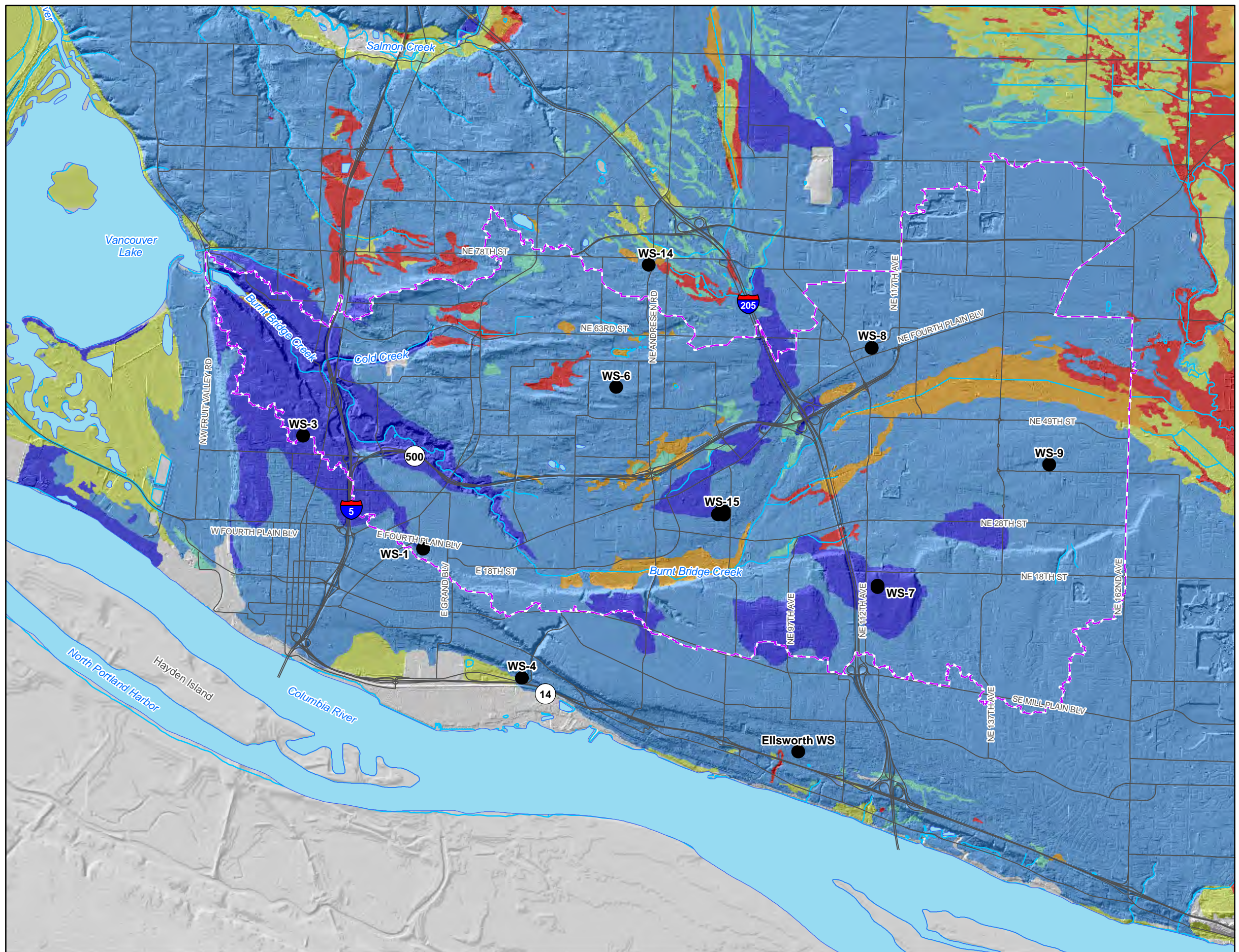


Figure PGG-2.
Hydrologic Soil Groups.

Legend

Hydrologic Soil Groups

- A
- B
- B/D
- C
- C/D
- D
- BBC Basin
- Vancouver Water Stations

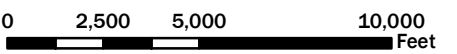
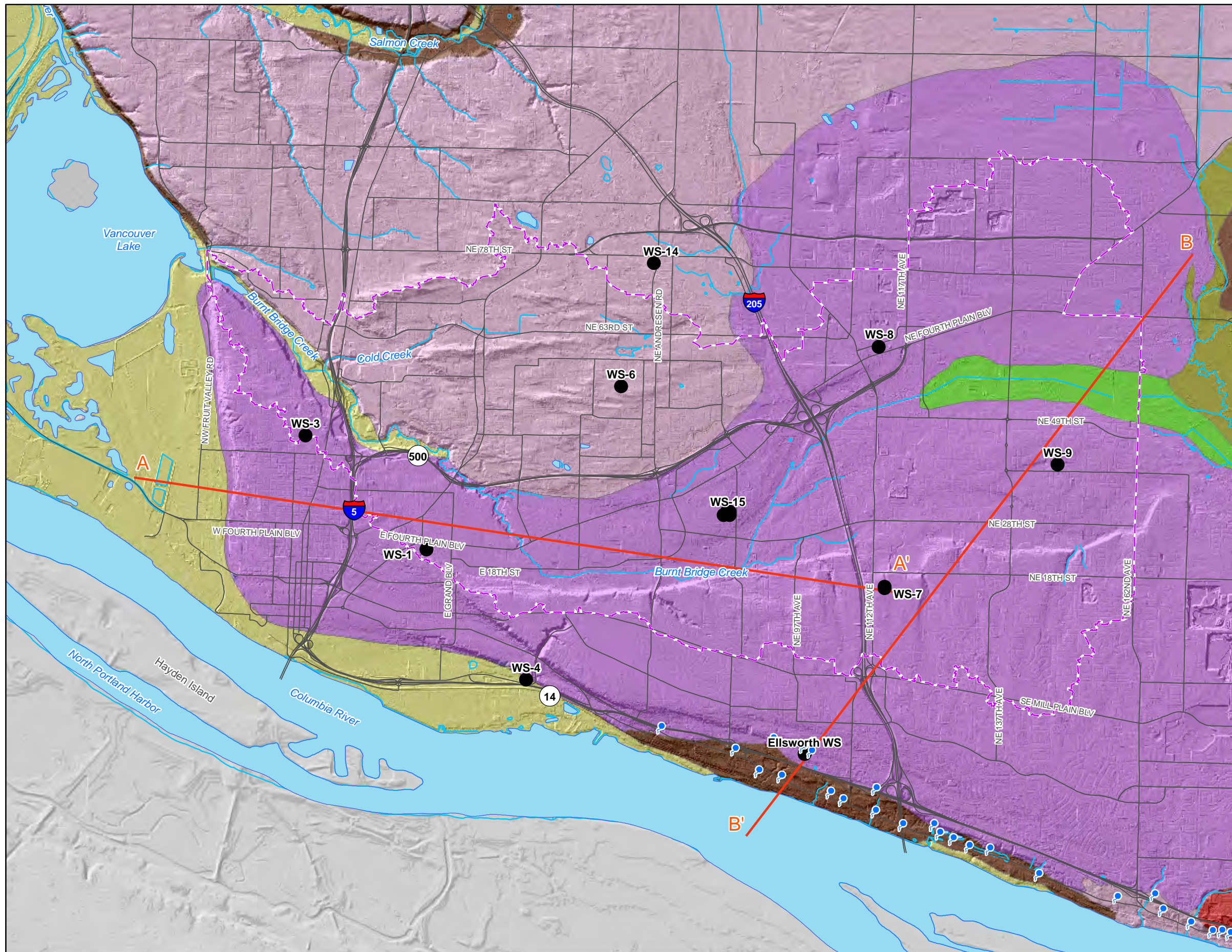


Figure PGG-3.
Surficial Geology.



Legend

Springs (from WSP-1600)

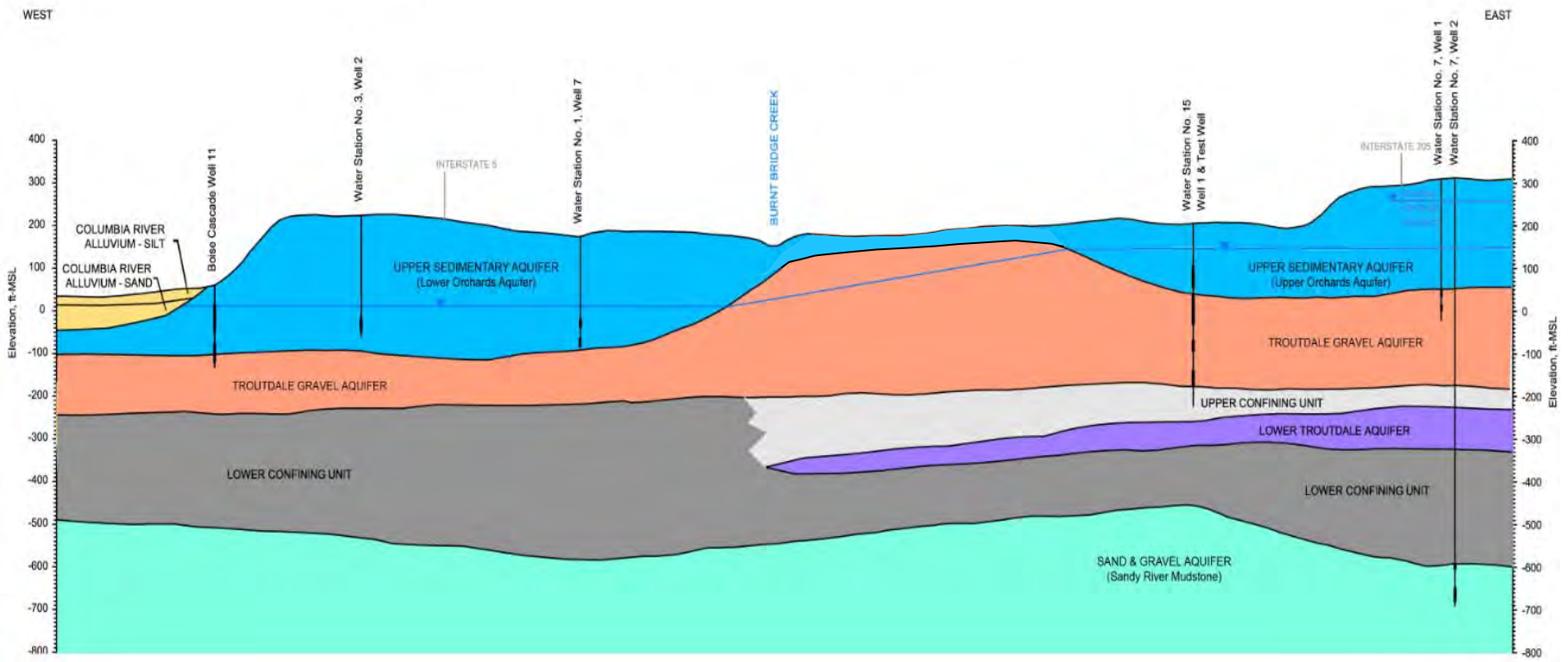
Surficial Geology (WDNR 100k)

- Recent Alluvium
- Peat Deposits
- Alluvial Fan Deposits
- Pleistocene Alluvial Deposits, Sand & Silt
- Pleistocene Alluvial Deposits, Gravel
- Upper Troutdale Formation
- Bedrock Outcrop
- Cross-Section Alignments
- BBC Basin
- Vancouver Water Stations



0 2,500 5,000 10,000
Feet



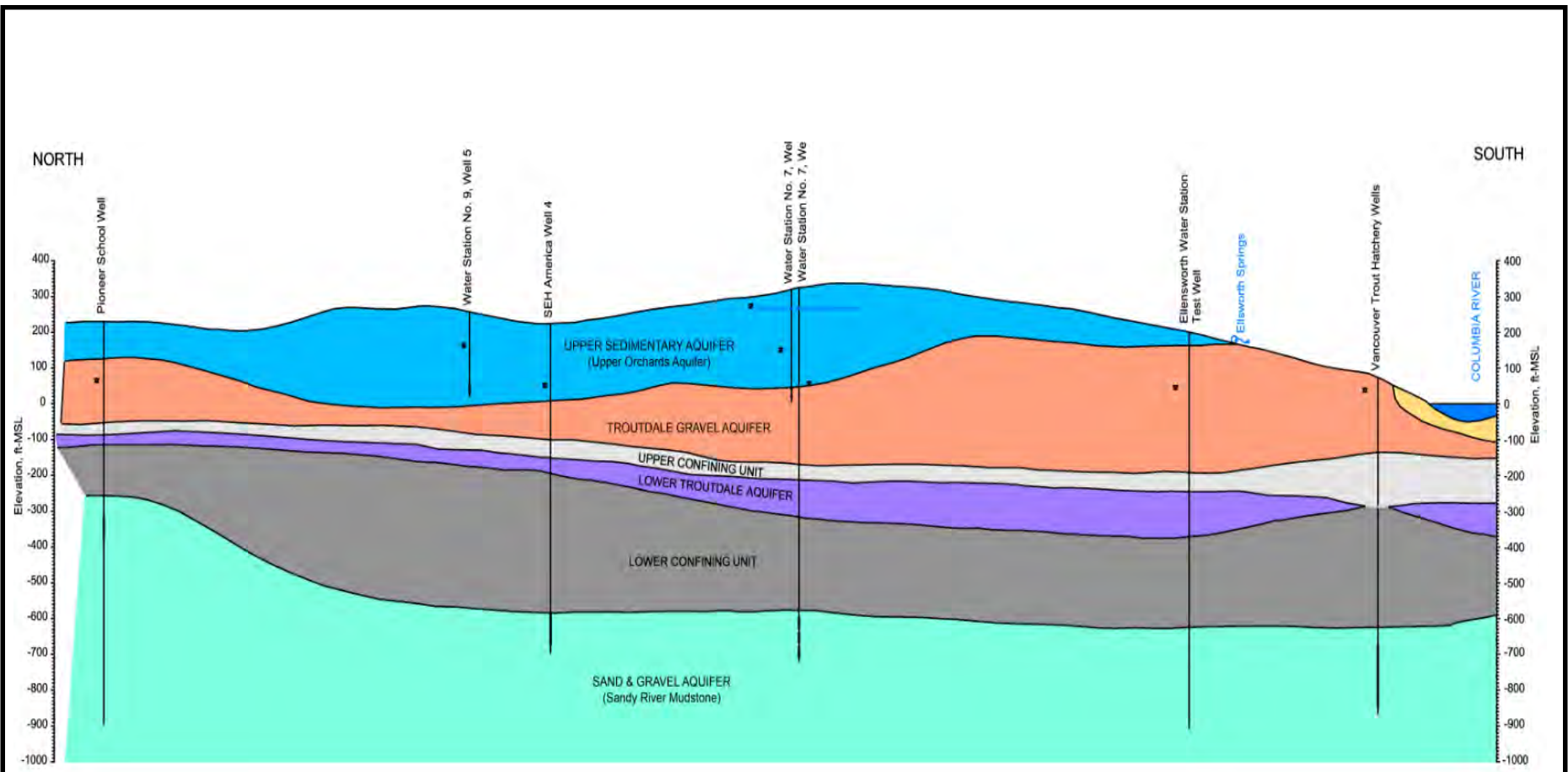


Modified from City of Vancouver Water System Plan (prepared by Robinson & Noble Inc. and presented in HDR 2007)

Figure PGG-4.
Hydrogeologic Cross-Section A-A'.

City of Vancouver
Watershed Health Assessment





Modified from City of Vancouver Water System Plan (prepared by Robinson & Noble Inc. and presented in HDR 2007)

**Figure PGG-5.
Hydrogeologic Cross-Section B-B'.**

**City of Vancouver
Watershed Health Assessment**



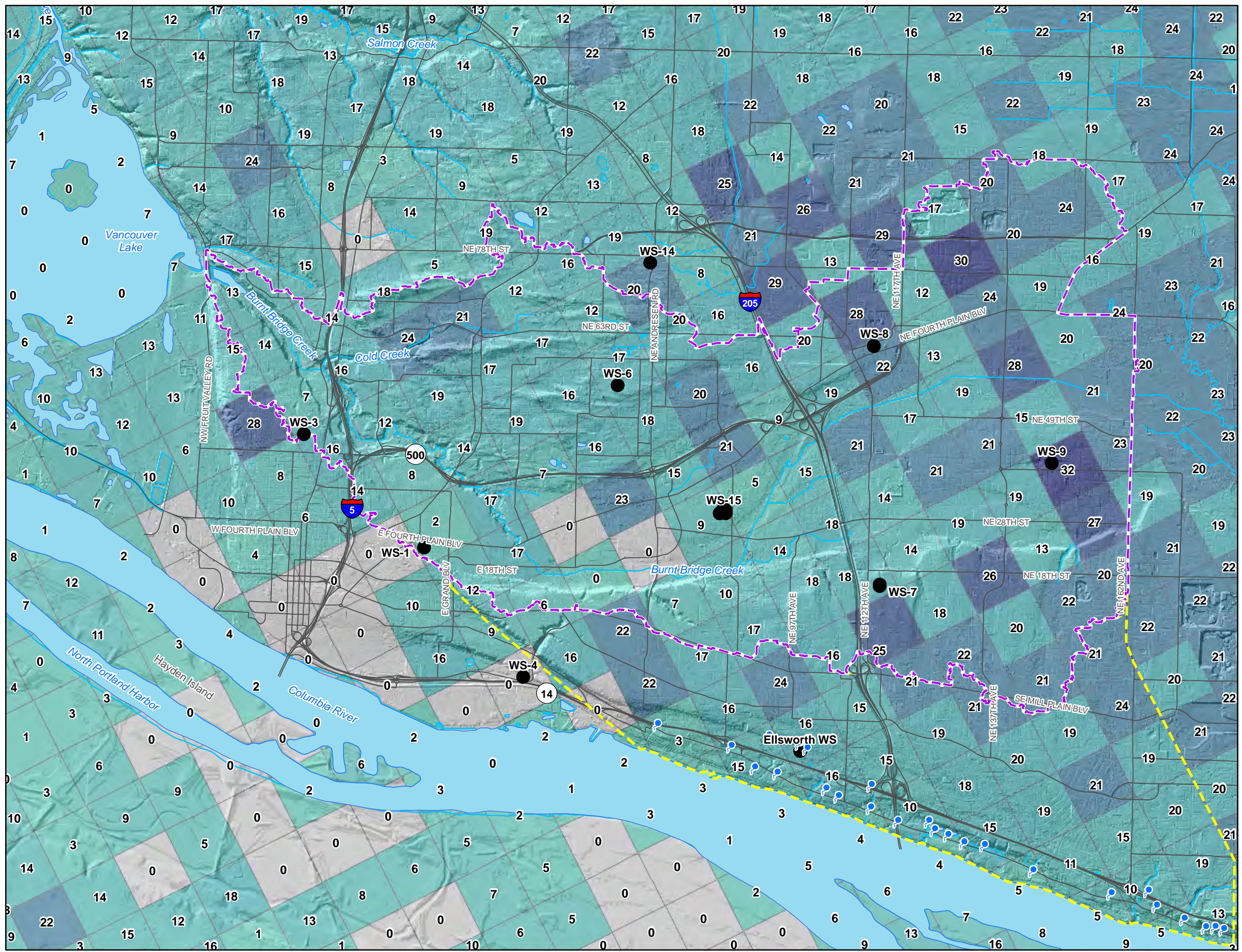


Figure PGG-6.
USGS Estimated
Groundwater Recharge

Legend

Precipitation + Dry-Well Recharge (inches/year)

0.0
0.1 - 5.0
5.1 - 10.0
10.1 - 15.0
15.1 - 20.0
20.1 - 25.0
25.1 - 30.0
30.1 - 35.0
35.1 - 40.0

- Springs (from WSP-1600)
- BBC Basin
- Columbia Slope Basin
- Vancouver Water Stations

N

0 2,500 5,000 10,000 Feet

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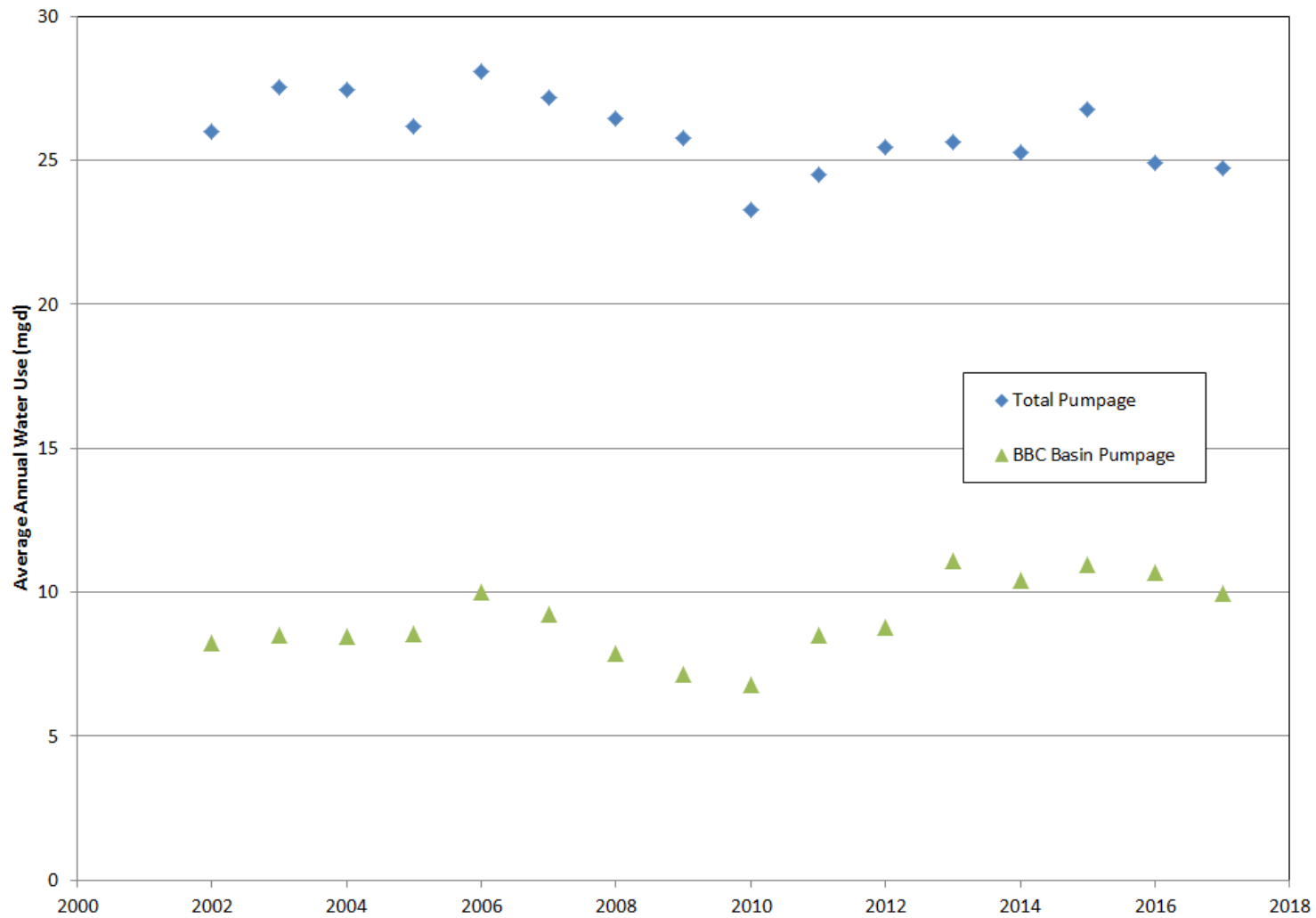
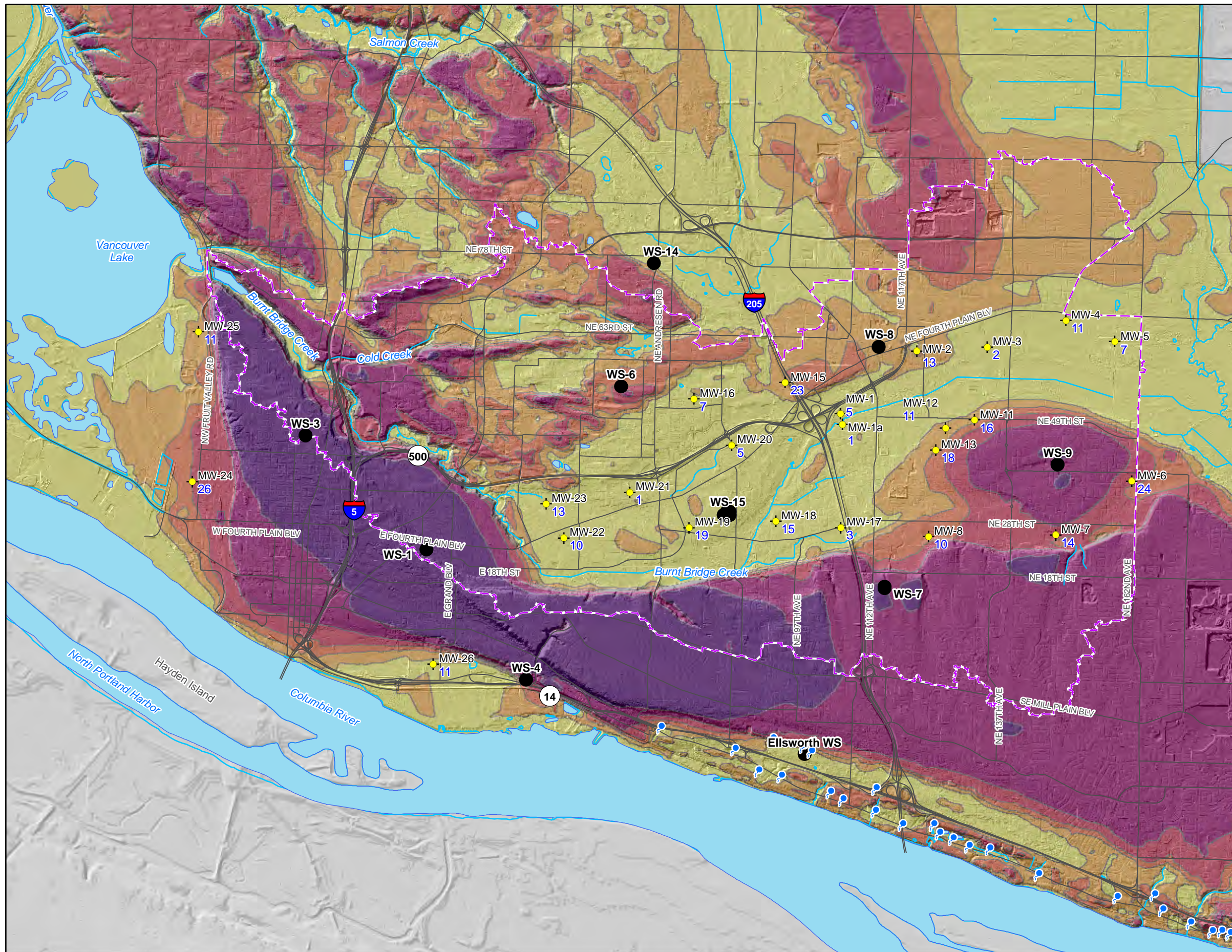


Figure PGG-7.
Annual Groundwater Withdrawals from City of Vancouver Water Stations.

Figure PGG-9.
Depth to Groundwater in USA.



Legend

Depth to Water Table

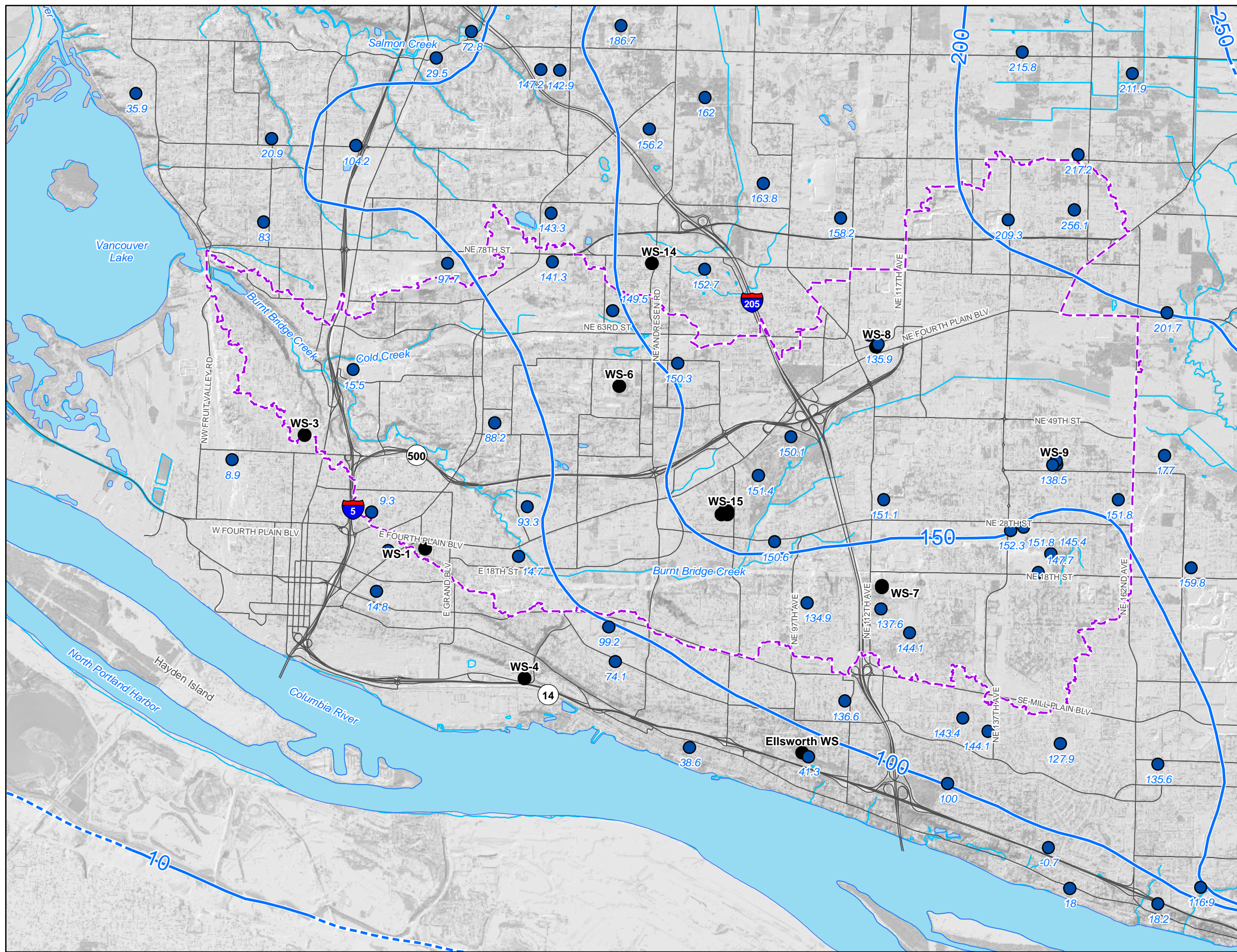
- 0 - 10 Feet
- 10.01 - 20 Feet
- 20.01 - 30 Feet
- 30.01 - 50 Feet
- 50.01 - 100 Feet
- 100 - 279 Feet
- Springs (from USGS WSP-1600)
- City Monitoring Wells (2017 Minimum)
- BBC Basin
- Vancouver Water Stations



0 2,500 5,000 10,000 Feet



Figure PGG-10.
Groundwater Elevation Map for
TGA



- Legend**
- USGS Wells with Elevations*
 - TGA Water Level Elevation Contours*
 - - - BBC Basin
 - Vancouver Water Stations

Elevation values in Feet NGVD29
 * From USGS WSP-2470-A



0 2,500 5,000 10,000 Feet



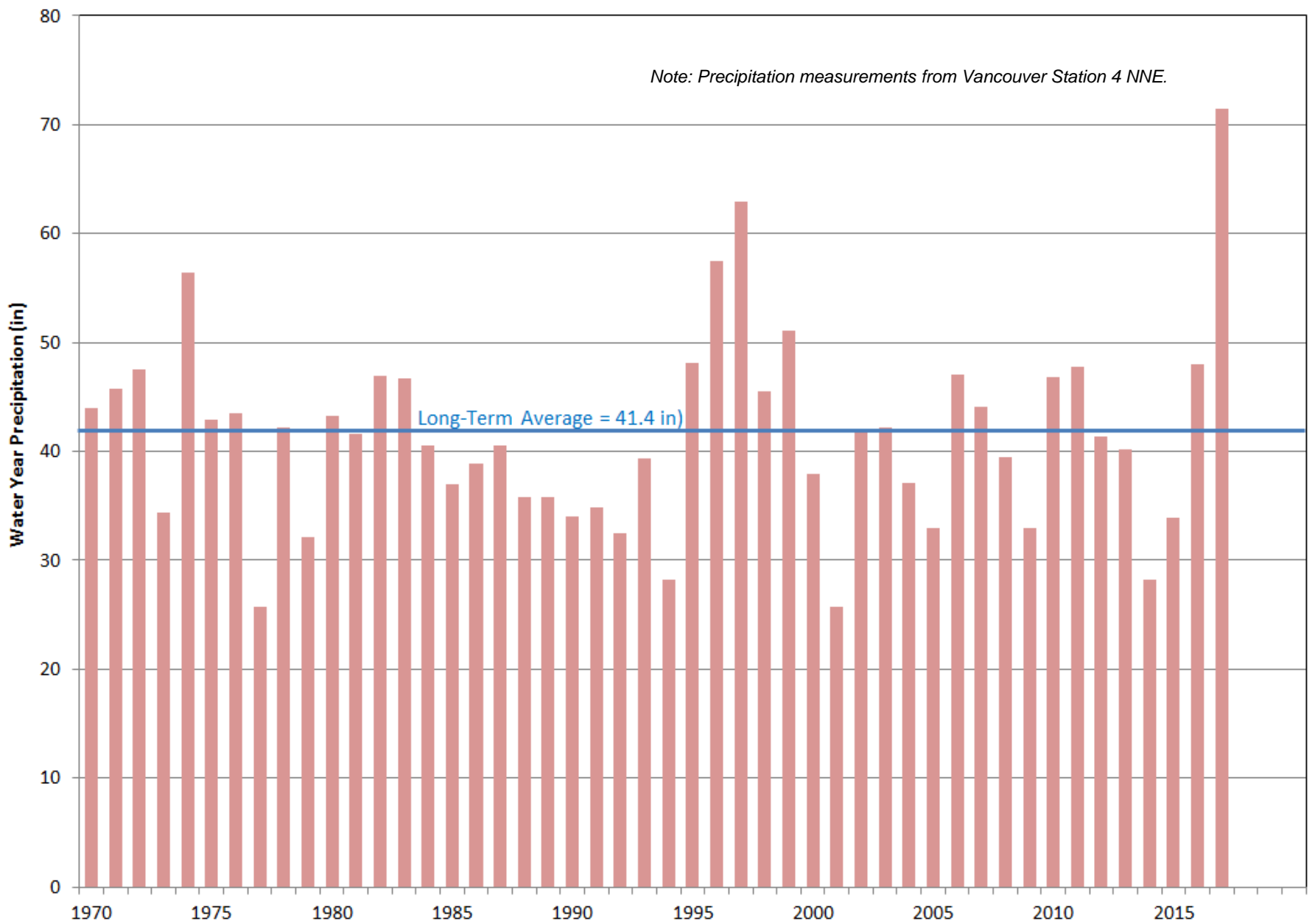


Figure PGG-11
Groundwater Level Trends in the Upper Orchards Area

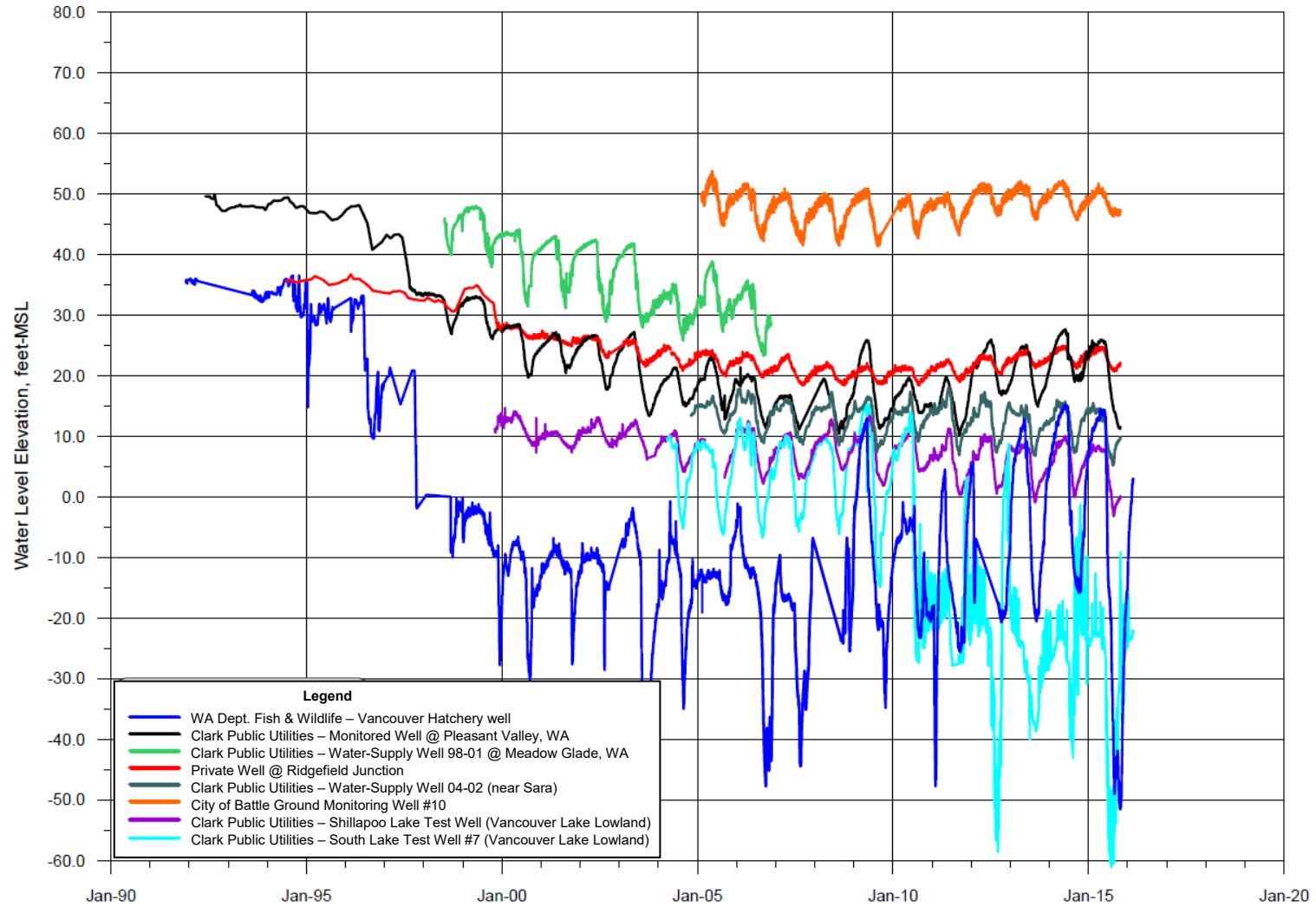


Figure PGG-12
Water-Level Trends in the SGA

City of Vancouver
 Watershed Health Assessment



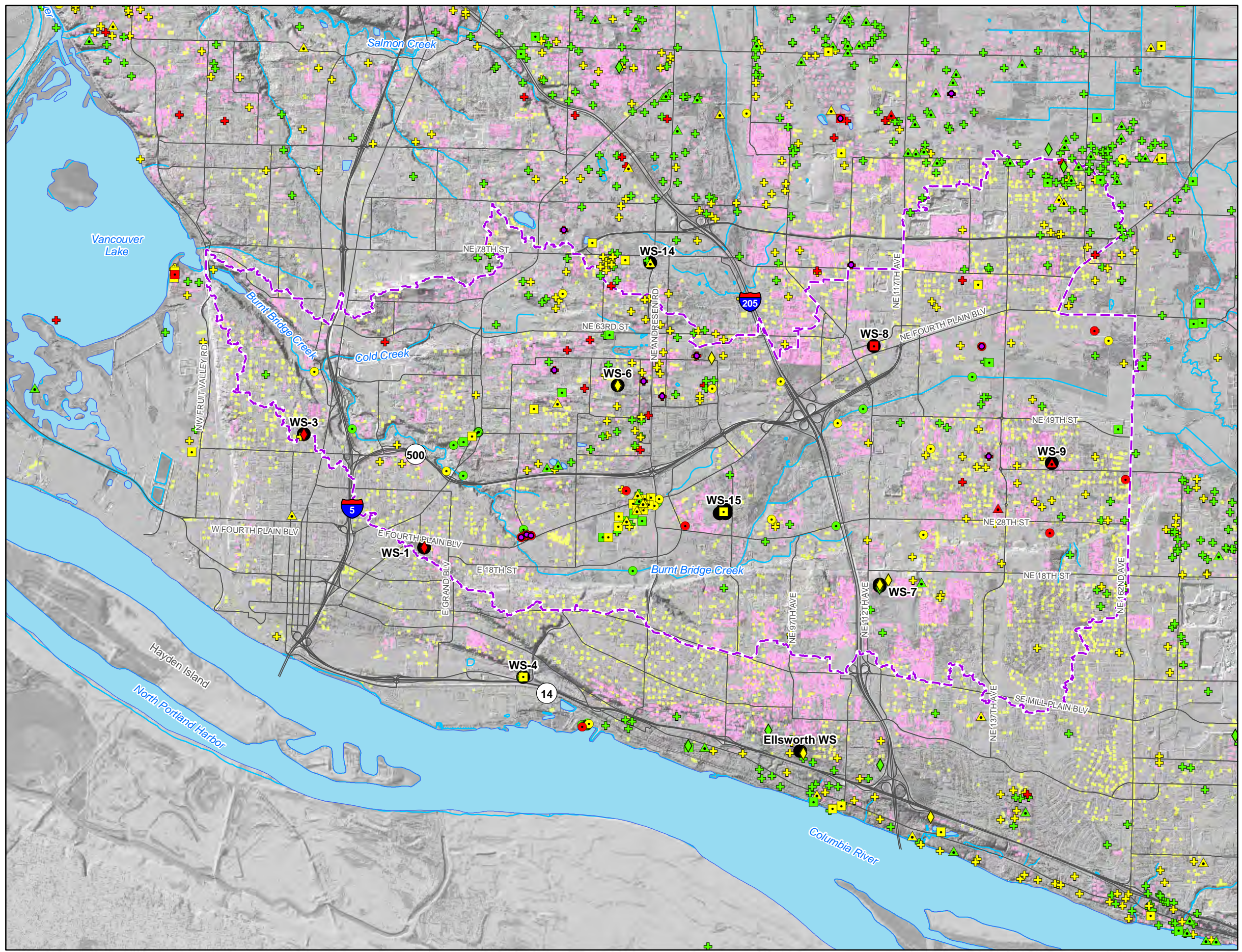


Figure PGG-13.
Maximum Nitrate
Observed in Groundwater

Legend

- Vancouver Water Stations
- ▭ BBC Basin
- ▭ Septic Systems
- ▭ Drywells

Well Depth (feet)

Well Depth (feet)	Nitrate Concentration (mg/l)
No Data	< 2.0 mg/l
>200	2 - 5 mg/l
100-200	5 - 10 mg/l
50-100	> 10 mg/l
0-50	< 2.0 mg/l

N

0 2,500 5,000 10,000 Feet

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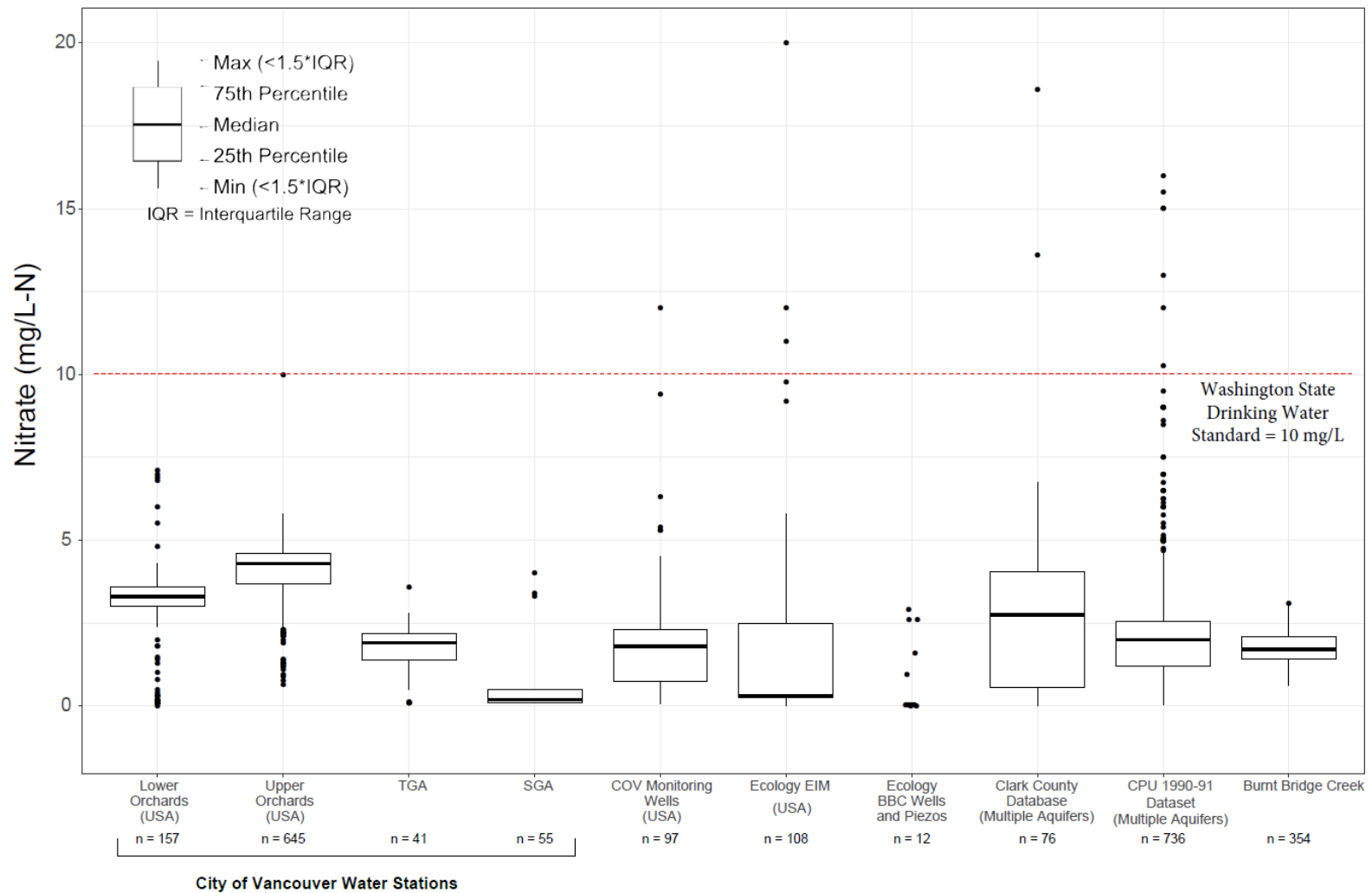


Figure PGG-14.
Nitrate Comparison by Aquifer.

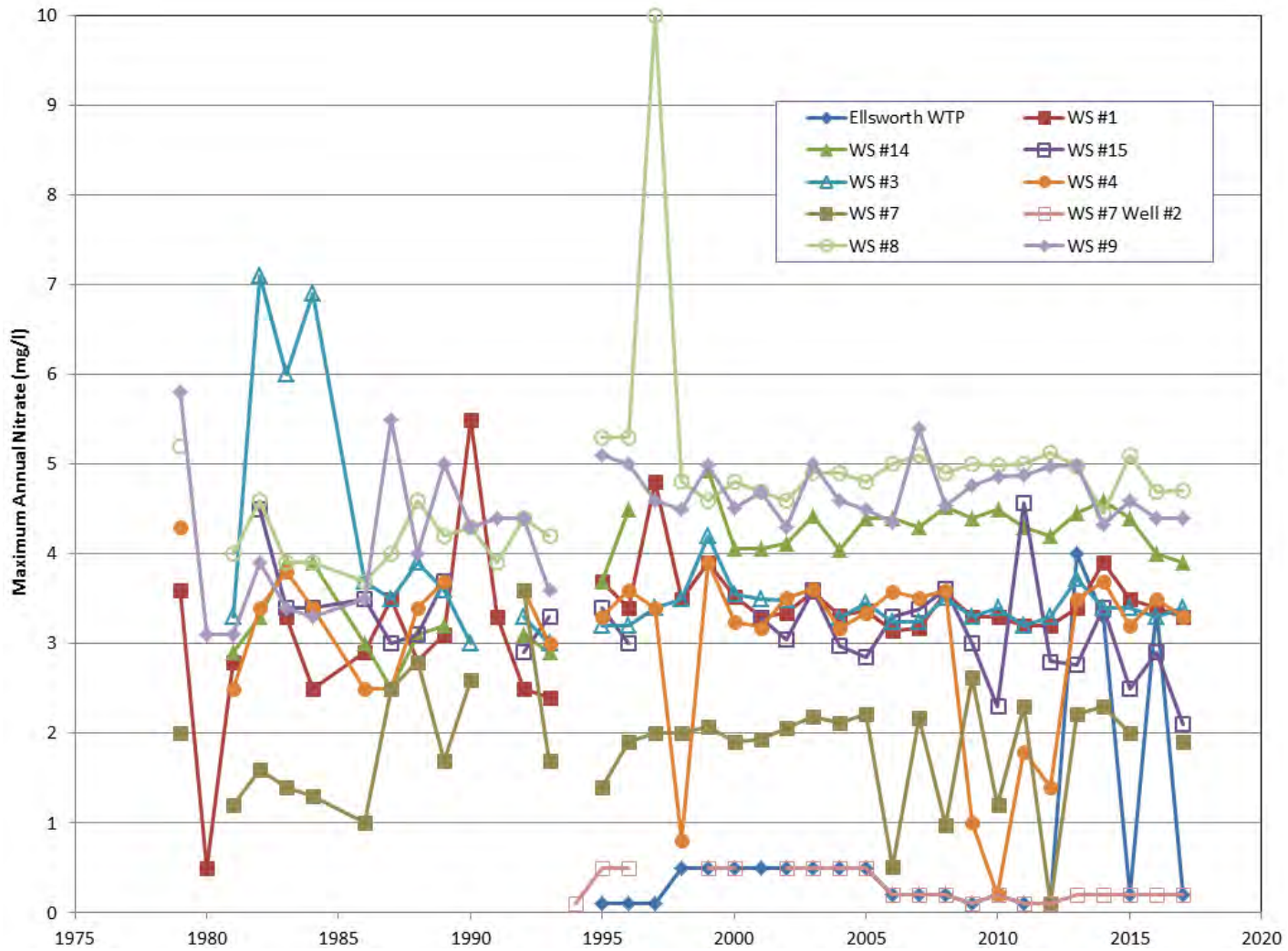
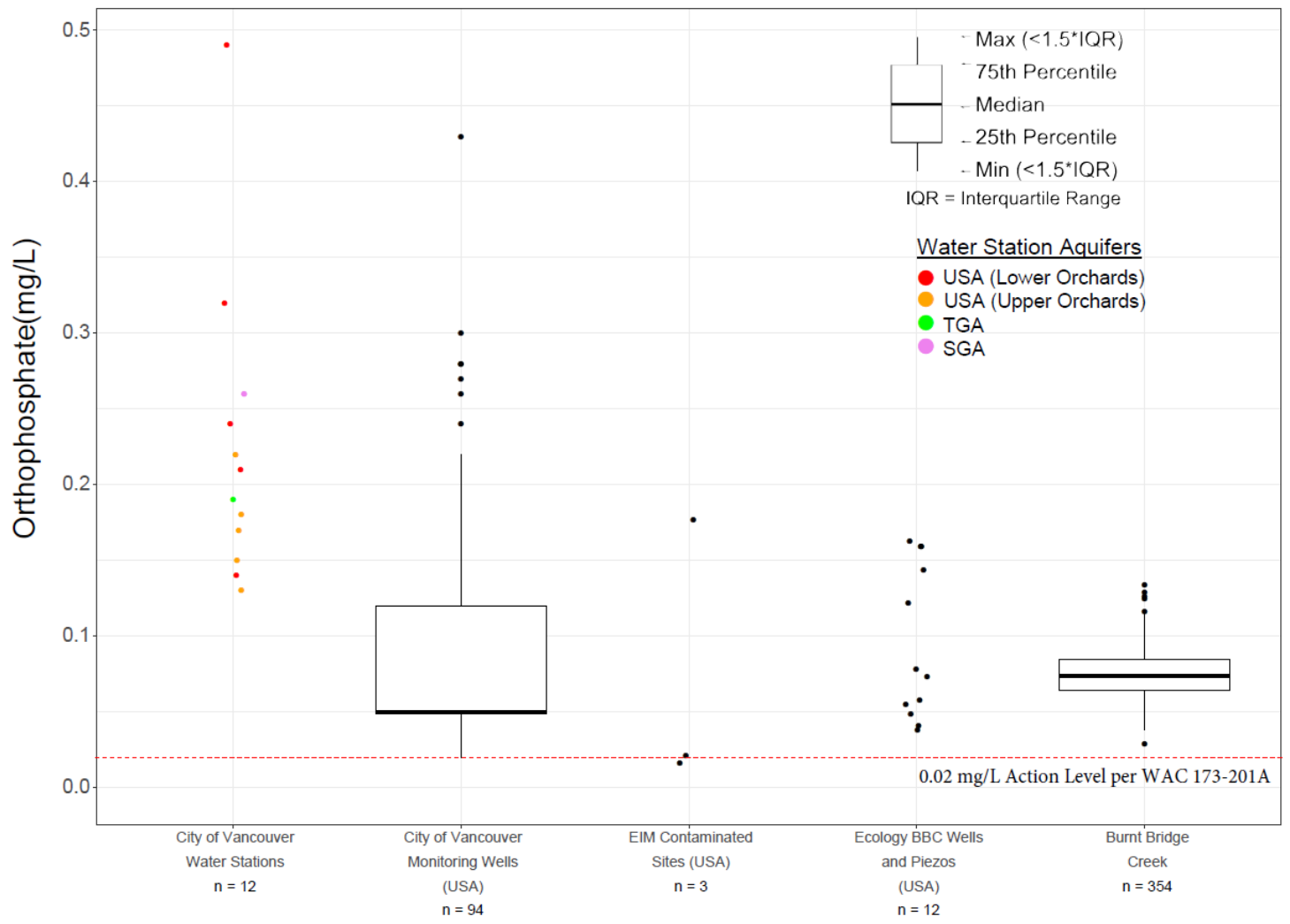


Figure PGG-15.
Nitrate Trends at City Water Stations.



**Figure PGG-16.
Phosphorus Comparison by Aquifer.**

