MEMORANDUM

Request for a 5-Year Renewal for ASR Limited License #010 June 2024 to June 2029

To: Jen Woody, RG, Oregon Water Resources Department

From: Renee Fowler, GSI Water Solutions, Inc.
Walt Burt, RG, GSI Water Solutions, Inc.

CC: Tom Pattee, Oregon Health Authority, Drinking Water Services
Seth Sadofsky, Oregon Department of Environmental Quality
Terrance Leahy, City of Tualatin
Nic Westendorf, City of Tualatin
Rachel Sykes, City of Tualatin

Attachments: Attachment A. ASR Limited License #010 Monitoring Plan for Water Years 2024–2028
Attachment B. Application for Renewal of Aquifer Storage and Recovery (ASR) Limited License

Date: October 10, 2023

The City of Tualatin (City) requests a 5-year renewal of Aquifer Storage and Recovery (ASR) Limited License #010, which will expire on June 9, 2024. Certain criteria must be met to grant a renewal, including (1) the City demonstrating that further testing is necessary, and (2) the City complying with the terms of the license. Proposed changes to the City's monitoring plan are included in Attachment A, the application for the renewal of the ASR limited license is provided in Attachment B, and a discussion of the criteria and rationale for renewal of the ASR limited license are provided in this memorandum.

Changes to the Monitoring Plan

The following change to the City's monitoring plan is proposed for ASR pilot testing under a renewed ASR limited license and is included as a revision in the attached monitoring plan (Attachment A):

- **Removal of Two (2) Storage Zone (Deep) Observation Wells.** Two existing observation wells open in part to the ASR storage zone for the City's ASR Well No. 1 are located on properties that were sold to Schnitzer Properties (Schnitzer) in November 2021, with possession starting in spring 2022. The two wells in question are the Roarke Well (WASH 12185/WASH 12166) and Pasture Well (WASH 856). When the City contacted Schnitzer to negotiate continued access to the wells, Schnitzer indicated that that they decided to decommission these wells. Consequently, the City contacted the Oregon Water Resources Department (OWRD) for a path forward. The agreed on course of action was to simultaneously (1) evaluate the potential presence of one or more suitable replacement deep storage zone observation wells, and

(2) review monitoring data from collected since the inception of pilot testing to assess the need to replace the deep decommissioned wells.

GSI Water Solutions, Inc. (GSI), on behalf of the City, identified and evaluated 15 well logs for relatively deep wells as potential candidates to replace the Roarke and Pasture observation wells in the Tualatin ASR Observation Well Network. Hydrographs for wells with time-series data of groundwater levels were also reviewed for the Tualatin area. Two wells (WASH 13627 and WASH 58796) were identified as potential candidates to maintain the current areal monitoring coverage; however, it is GSI's opinion after review of the monitoring data that replacement of the two decommissioned wells would not substantively improve the understanding of the hydraulics and potential effects of ASR in the storage zone.

Analysis of well construction and time-series groundwater levels shows that most of the current and former potential observation wells in the area have shallow seals and therefore groundwater level data from these wells integrates dynamics of both the storage (deep) zone and shallower bearing units rather than just the ASR storage zone. Additionally, several groundwater stressors in the area, such as quarry dewatering, historical interference from non-City municipal wells, existing (and potential future) commingling wells, and long-term precipitation trends, complicate the interpretation of groundwater level trends in the Tualatin area. Furthermore, the City retains access to two deep observation wells: the Exploratory Well (WASH 58802) adjacent to ASR Well No. 1, and the Tualatin High School Well (WASH 1694). The Exploratory Well is completed in the same water-bearing zones as ASR Well No. 1 and provides the most representative data for the hydraulic response to ASR in the storage zone. The Tualatin High School Well is completed in the upper portion of the storage aquifer and shallower water-bearing zones, similar to the two decommissioned wells. Therefore, the loss of the two observation wells (Roarke Well [WASH 12185] and Pasture Well [WASH 856]) will not negatively impact the current monitoring effort.

Reason for Renewal

The City requests a renewal of ASR Limited License #010 to continue evaluating the capacity of ASR Well No. 1 and retain the possibility of exploring the feasibility of expanding its ASR system as the City continues to plan for meeting growing demands.

ASR Limited License #010 authorizes the City to:

- Store up to 475 million gallons (MG) using up to five wells,
- Inject at a maximum rate of 550 gallons per minute (gpm) per well, and
- Recover at a maximum rate of 700 gpm per well.

The City has operated ASR Well No. 1 as its sole ASR well, with injection rates of up to 517 gpm (0.74 million gallons per day [mgd]), recovery rates up to 493 gpm (0.71 mgd), and storage volumes of up to 193.86 MG with carryover and an annual maximum injected volume of 77 MG in the last 5-year period. ASR Well No. 1 has served as a key water supply facility for the City for meeting peak demands and as an emergency backup source of supply. Additionally, the City anticipates installing a 2 million gallon above-ground reservoir and pump station on the same tax lot as ASR Well No. 1 to provide resiliency and redundancy within the distribution system.

Expansion of the ASR system to supplement the City's supply portfolio for meeting future projected summertime peak demands and provide an emergency source should the City's primary supply (Portland Water Bureau) be interrupted has been deferred because of the effects of activities at Coffee Lake Quarry (Quarry). The Quarry is indirectly depressurizing the ASR storage aquifer through non-municipal commingling wells. The City is currently revising its backup water supply strategy and would like to delay a final decision on ASR expansion until that process is complete.

The City requests an extension of time to continue to evaluate the capacity of the existing ASR system and to potentially evaluate expansion before applying for an ASR permit. Specifically, the City is requesting a 5-year renewal of the ASR Limited License #010 from June 9, 2024, to June 8, 2029.

Compliance with Terms and Conditions of the Current Limited License

Several terms and conditions are defined in ASR Limited License #010, such as groundwater monitoring, water quality sampling, and rate limits for injection and pumping. The City has complied with the terms of the ASR limited license and has worked in good faith to report ASR pilot testing data to OWRD on a regular basis.

Each condition outlined in ASR Limited License #010 is listed below with specific details that demonstrate the City's compliance with the conditions:

1. **License Renewal**. *The license may be renewed if the licensee demonstrates to the Director's satisfaction that further testing is necessary and that the licensee complied with the terms of the license.*
    - This memorandum requests a renewal of ASR Limited License #010 in order to extend the license for 5 more years.
    - The reasons that further testing is necessary are discussed above, under "Reason for Renewal." The City's compliance with the terms of the license is documented in this section.
2. **Notice Prior to Injection and Recovery**. *The licensee shall give notice, in writing, to the watermaster not less than 15 days in advance of either initiating any injection under the license or recovering stored water. The injection notice shall include the license number, the location of the injection source water diversion, the quantity of water to be diverted from that source, the time of injection, and the place of injection. The recovery notice shall include the license number, the location of the recovery well(s), the time of recovery, and the quantity of water to be recovered.*
    - The City has notified the Watermaster in writing each year before initiating injection and recovery.
3. **Record of Use**. *The licensee shall maintain a record of injection and recovery, including the total number of hours of injection and recovery and the total metered quantity injected and recovered. The record of use may be reviewed by Department staff upon request.*
    - The City has kept records of the injection and recovery volumes and has reported the data to OWRD in the ASR annual reports. The City submits digital copies of all electronically recorded water level and pumping rate data to OWRD as part of the annual reports.
4. **Modification/Revocation**. *The Department shall notify the licensee in writing and allow the licensee to respond when considering [modifying or revoking the ASR limited license].*
    - The City understands OWRD will provide written notice of any changes that may be made to the ASR limited license. A modification to the monitoring plan for the ASR limited license is listed above and documented in the attached monitoring plan. Historical monitoring modifications (under the current and past issuances of the limited license and associated monitoring plans) have been reviewed and approved by OWRD.
5. **Priority/Protection**. *This license does not receive a priority date and is not protected under ORS 540.045.*
    - The City understands that the limited license does not receive a priority date like a water right.
6. **Compliance with Other Laws**. *The injection of acceptable water into the aquifer as well as its storage and recovery under this license shall comply with all applicable local, state, or federal laws. This shall include, but not limited to, compliance with the Oregon Department of Environmental Quality's (DEQ's) Underground Injection Control registration program as authorized under the Safe Drinking Water Act (40*

CFR 144.26). Also, all pilot test discharges to waterways must be covered by a DEQ National Pollution Discharge Elimination System (NPDES) Permit.

- The City completed a DEQ Underground Injection Control (UIC) registration for ASR Well No. 1, and has complied with all state and local permits with regard to injecting, recovering, and pumping water to waste.

7. **Detailed Testing Plans**. *The licensee shall submit a detailed plan of testing for each injection well as the project develops. The licensee shall obtain Department approval of a detailed plan before injection testing at a well may begin. The Department may approve, condition, or reject a detailed plan.*

   - The City submitted an ASR work plan before pilot testing at ASR Well No. 1, and provided addenda that outlined proposed changes to the monitoring plans.

8. **Water Quality Conditions and Limits**.

   - With the exception of one sample, analyte concentrations in injected water and recovered water have met all state (Oregon Health Authority [OHA] Drinking Water Services [DWS] and state regulatory ASR water quality criteria) and federal drinking water standards. The initial source water sample for Cycle 11 (Water Year 2019) was obtained downstream and simultaneous of a shakedown test of the booster chlorination system after replacing the chlorine pumps. This sample had an exceedance of total trihalomethanes (THMs), likely because the chlorine injection system had not yet stabilized. Additionally, this initial source water sample exceeded the secondary maximum contaminant level for total iron and total manganese, but these are non-enforceable guidelines for cosmetic and aesthetic purposes. Concentrations of all analytes in subsequent injection water and water recovered (i.e., water introduced into the City's distribution system) in Cycle 11 met regulatory water quality standards.

9. **Water Quality Sampling**.

   - The City continues to collect water quality samples in compliance with the terms outlined in the ASR limited license and the approved work plan, ensuring water delivered to its customers meets all federal and state drinking water standards, and is in compliance with rules administered by OHA's DWS.

10. **Water Level Monitoring**.

    - The City has maintained a detailed monitoring plan to measure the response in the regional aquifer related to ASR activities by the City. The only change that occurred within the last 5-year period was the change in ownership and subsequent removal of two observation wells (Pasture Well and Roarke Well) from the Observation Well Network. This change is described in the "Changes to the Monitoring Plan" section above and is incorporated in the attached monitoring plan.

11. **Recovery**.

    - The City has recovered no more than 95 percent of the annually stored or carryover ASR volume. Yearly reporting to OWRD has documented the amount of recovered water.

12. **Reporting**.

    - Annual water year ASR reports have been submitted to OWRD each year of ASR pilot testing, and includes all required data related to water quality and water level monitoring.

13. **Protection for Existing Users**. *In the event of conflicts with existing appropriators, the licensee shall conduct all testing so as to mitigate the injurious effects. In addition, the licensee shall cooperate with the efforts of the Department to protect existing water rights and the water quality of existing users that rely upon the receiving aquifer and the injection source water.*

    - No injuries to existing groundwater users have been reported since the start of ASR activities by the City.

14. **Use of Recovered Water**. *The licensee shall use any recovered water for the purposes described in ORS 538.420.*

    - The recovered water has been put to beneficial municipal use by the City.

15. **Additional Conditions on an Informal Basis**. *The Department may suggest additional conditions to the licensee. Provided that those conditions are agreed to and undertaken by the licensee, the Department may forego formal changes to this license. This informal process does not extend to condition reductions. These additional conditions may be part of any license renewal or permit.*

    - OWRD has not suggested additional conditions to the limited license since its issue date.

16. **Other Measures**. *The licensee shall take additional measures, as appropriate, to address ASR-related issues such as landslide activation, seepage, streamflow increases, interference with nearby wells, aquifer storage limitations, and water quality protection. Further, the licensee shall notify the Department upon resolution of such issues. The licensee shall resolve these issues prior to submittal of an ASR permit application.*

    - No additional measures to address ASR-related issues were necessary during the previous 5-year pilot testing period.

17. **Carryover Storage**. *At the end of testing under this license, the licensee shall provide an accounting to the Department of the residual stored water based on the methods of determination given in this license. The Department shall consider this residual for carryover to a permanent ASR permit based on information which discloses the aquifer's ability to retain stored water.*

    - A running account of the amount of recovered ASR water and carryover storage volumes using methods of determination in the ASR limited license have been submitted to OWRD as part of the ASR annual reports.

18. **Specifical Reporting Condition**.

    - The City has submitted all relevant information required by OWRD since the ASR limited license was originally granted and will continue to do so during the next 5-year pilot testing period.

19. **Well Tag Condition for Licensee Wells**. *Prior to testing, the licensee shall ensure that the wells have been assigned a Department Well Identification Number (Well ID Number). A tag showing the Well ID Number shall be permanently attached to the wells. If a well does not have a Well ID Number, the licensee shall apply for one from the Department and attach it to the well. The Well ID Number shall be used as a reference in any correspondence regarding the well, including any reports of water use, water level, or pump test data.*

    - ASR Well No. 1 was assigned an OWRD well ID number, which has been attached to the well.

20. **Well Construction**. *Injection and recovery wells shall be open to a single aquifer in the Columbia River Basalt Group and shall meet applicable well construction standards (e.g., OAR 690-200 and OAR 690-210). Following well completion, the wells shall be thoroughly developed to remove cuttings and drilling fluids. A video log of the wells shall be collected to demonstrate to the satisfaction of the Department that each well is only open to a single aquifer. Additional data that help characterize the water-bearing-zone characteristics, including water quality and temperature, may also be provided to the Department. The wells shall be designed to limit the irretrievable loss of injected water to unsaturated zones.*

    - ASR Well No. 1 was constructed in compliance with applicable well construction standards.

21. **Cuttings**. *During drilling of new project wells, the licensee shall collect cuttings at a minimum of 10-foot intervals and at major formation changes. The licensee shall describe and analyze them to the degree necessary to determine the formation, member and flow unit within the Columbia River Basalt of the water-bearing zone, and provide a split of the washed cuttings to the Department.*

    - No drilling was conducted during the course of the last ASR limited license. The City will provide cuttings to OWRD if new wells are constructed.

Closing

Thank you for considering this request for a 5-year renewal of ASR Limited License #010. The ASR Limited License #010 Monitoring Plan for Water Years 2024–2028 is provided in Attachment A. The Application for Renewal of ASR Limited License form is provided in Attachment B. The associated fee of $575 for renewal of a limited license for ASR testing purposes is also provided. Please contact Walt Burt (971.200.8508) or Renee Fowler (971.200.8511) with any questions.

Attachment A

ASR Limited License #010 Monitoring Plan for Water Years 2024–2028

GSI Water Solutions, Inc.

TECHNICAL MEMORANDUM

ASR Limited License #010 Monitoring Plan for Water Years 2024–2028

To: Jen Woody, RG, Oregon Water Resources Department
Tom Pattee, Oregon Health Authority, Drinking Water Services
Seth Sadofsky, Oregon Department of Environmental Quality

From: Renee Fowler, GSI Water Solutions, Inc.
Walt Burt, RG, GSI Water Solutions, Inc.

CC: Terrance Leahy, City of Tualatin
Nic Westendorf, City of Tualatin
Rachel Sykes, City of Tualatin

Attachments: Table 1. Observation Well Network Construction Details
Table 2. Summary of Water Quality Sampling Program
Table 3. Source Water Analytical List
Table 4. Pre-Injection Groundwater and Recovered Water Analytical List
Figure 1. Site Map
Attachment A. Oregon Water Resources Department Water Well Reports

Date: October 10, 2023

This document summarizes the monitoring plan for the City of Tualatin's (City's) Aquifer Storage and Recovery (ASR) pilot testing program under ASR Limited License #010 during Water Years 2024 through 2028 (June 2024 through June 2029). The ASR limited license authorizes the City to store up to 475 million gallons (MG) of water using five ASR wells. The City is currently pilot testing one ASR well (ASR Well No. 1) with a long-term plan to consider expanding its ASR system to meet projected future water supply needs.

The City has nearly completed 15 pilot testing cycles of the existing ASR system. The current cycle, Cycle 15, involved injecting approximately 66.28 MG, and the City anticipates recovering 60 MG. The City currently recovers water at a rate of approximately 310 to 495 gallons per minute (gpm), dependent on water levels in the target aquifer. ASR Well No. 1 has become an integral element of the City's supply system. The City is applying to renew its ASR limited license to continue pilot testing with the following 5-year objectives:

1. Evaluate and optimize potential operational rates and volumes for the target basalt aquifer at ASR Well No. 1.
2. Continue to evaluate long-term aquifer response, well performance, and water quality conditions.
3. Identify and evaluate favorable opportunities for expanding the ASR system.

1. ASR System

The following sections summarize the water level monitoring and water quality monitoring program for Cycle 16 (Water Year 2024) and subsequent cycles.

1.1 Cycle Testing Schedule

Each cycle will consist of the following:

- An injection period of 75 to 160 days at a target injection rate of approximately 330 to 375 gpm to result in an injected volume of 50 to 75 MG.
- A storage period of up to 60 days, depending on the ASR system demand.
- A recovery period of 75 to 160 days resulting in recovery of approximately 50 to 75 MG at estimated rates of 300 to 375 gpm. Recovery rates and volumes will be dictated by ASR system demand and the permitted maximum recovery percentage of 95 percent.

The recovered water will be delivered to the City's distribution system. The duration and volume of recovery will be based on one or more of the following criteria:

1. System demand,
2. Aquifer response and water availability during recovery,
3. Exceedance of aesthetic-based water quality standards (i.e., secondary maximum contaminant levels), based on field water quality parameter criteria developed during prior cycle testing, and/or
4. 95 percent allowable recovery and/or the volume of the storage account has been depleted.

A small percentage of injected water (an estimated 5 to 10 percent of the injected volume, or approximately 2 to 8 MG) will be discharged to the sanitary sewer system (via the onsite detention pond) during regular backflushing, which occurs during the injection period to maintain well performance.

1.2 Water Level Monitoring

This section describes the water level monitoring network developed to evaluate response and influences on other groundwater users whose wells are completed in both the shallow and deeper basalt aquifer units near ASR Well No. 1. Water levels are monitored in select wells to evaluate potential impacts from ASR operations and evaluate storage and recovery potential and limitations.

1.2.1 Observation Well Network

The City established a network of observation wells for ASR pilot testing to evaluate ASR feasibility and system parameters, and to identify and evaluate potential impacts from ASR operations. The City monitored water levels in all observation wells that were used to evaluate aquifer responses to ASR testing during Cycles 6 through 15, with only minor modifications (described below). This observation well network will be partially retained during Cycles 16 through 20, with a modification described in Section 1.2.3.

The observation well network includes (1) wells open to one or more or the water-producing zones in the basalt ASR storage zone (Storage or Deep Zone), defined as approximately 480 feet below ground surface (bgs) (elevation -147 above mean sea level [amsl]) or projected to be within and below the Ortley Member of the Grande Ronde Basalt; and (2) wells open to shallow water-producing zones, stratigraphically above the ASR storage zone (Shallow Zone). The network of observation wells includes two that are proximal to ASR Well No. 1 and two distal wells.

In addition to ASR Well No. 1, the observation wells incorporated into the water level monitoring program are summarized below and in Table 1. The locations of the wells are shown in Figure 1. Well logs for these wells are provided in Attachment A.

1.2.2 Shallow Zone Wells

- Shallow Basalt Well (WASH 3331), located onsite of ASR Well No. 1
- Tri-County Gun Club Well (WASH 73811)

Water levels will be measured in the shallow basalt wells to evaluate the degree of hydraulic communication between the shallow basalt and the deeper target aquifer interflow zones. This information will be used to assess if any head changes occur in the Shallow Zone during injection or pumping of ASR Well No. 1, and whether there are any potential adverse impacts on the shallower wells.

1.2.3 Storage or Deep Zone Wells

- Exploratory Well (WASH 58802), located onsite of ASR Well No. 1
- Tualatin High School Well (WASH 1694)

Wells completed in the target Storage or Deep Zone portion of the basalt aquifer will be used to assess the amount and possible extent of head buildup during injection, drawdown during pumping, range of influence, and the potential for any adverse impacts on these and other deep wells.

Modifications to Storage or Deep Zone monitoring include:

- In 2015, the Tualatin Valley Sportsman's Club Well (WASH 1847/1842) was taken offline and a new well, called the Tri-County Gun Club Well (WASH 73811), has taken its place in the observation well network. The Tri-County Gun Club Well was drilled to be slightly deeper than the Tualatin Valley Sportsman's Club Well and was deepened 5 years later (WASH 79009). A similar water level response pattern is present in the new as the old well.
- In late 2021, the properties where the Chick-a-Dee Nursery "Roarke" Well (WASH 12185 /WASH 12166) and Chick-a-Dee Nursery "Pasture" Well (WASH 856) were sold, with possession of the land beginning in spring 2022. When contacting the new landowner to set up access agreements, the City was informed of the owner's intent to abandon the wells. At OWRD's request, the City assembled and evaluated potential replacement wells. It was determined that adding wells into the monitoring network was unnecessary as (1) current and former potential observation wells in the area are open to shallow and deeper water-bearing zones and groundwater level data are not representative of the ASR aquifer in isolation, and (2) several groundwater stressors in the area, such as quarry dewatering, historical interference from non-City municipal wells, commingling wells, and long-term precipitation trends, complicate the interpretation of groundwater trends in the Tualatin area. The Exploration Well (WASH 58802) adjacent to ASR Well No. 1 likely gives the most accurate data for the ASR aquifer and, therefore, the loss of the two observation wells (WASH 12185 and WASH 856) will not negatively impact the current monitoring effort.

1.2.4 Water Level Monitoring Frequency

Before the start of each testing cycle, baseline monitoring will be conducted to obtain background water level data for all wells in the monitoring well network. Baseline water level monitoring will be conducted before the start of injection, while allowing the aquifer to recovery from previous pumping. Throughout each testing cycle, manual water level measurements will be collected on a periodic basis using an electronic water level sounder at all monitoring locations.

Water levels in ASR Well No. 1, Exploratory Well, Shallow Basalt Well, and Tualatin High School Well will be monitored with electronic data loggers. Electronic water levels will be measured during the injection and recovery phases every 10 minutes at ASR Well No. 1, every 30 minutes to 1 hour at the Exploratory Well, and every 1 hour at the other wells.

1.2.5 Seep Monitoring

Natural discharge of groundwater from the basalt aquifer may occur as the pressure in the aquifer increases if there is a preferential pathway for groundwater to reach the ground surface. ASR Well No. 1 is designed to seal off production zones in the aquifer down to an approximate elevation of 150 feet amsl. The nearby valleys have surface elevations ranging from approximately 150 to 250 feet amsl. No seeps were observed during injection phases of testing in 2019 through 2023.

Based on the depth of the seal below the surrounding natural ground surface, no natural discharge points associated with the target aquifer ASR production zones within the basalt sequence (such as springs or seeps) are expected in the nearby area, and prior monitoring for seeps has not identified any that are potentially associated with the ASR storage zone.

1.3 Water Quality Monitoring

The objectives of the water quality monitoring program include the following:

- Confirm that the recovered water meets the following Safe Drinking Water Act (SDWA) drinking water criteria:
  - Drinking water parameters, and
  - Aesthetics of the recovered water, taste, and odor.
- Confirm disinfection by-product (DBP) attenuation.
- Assess water quality with respect to the following:
  - Injection well clogging caused by particulates or turbidity, air, biological activity, and chemical reactions,
  - Mineral dissolution reactions in the aquifer that could affect recovered water quality,
  - Biofouling evaluation,
  - ASR well redevelopment and back-flushing criteria, and
  - Recovery efficiencies and mixing of stored and native groundwater.

Water quality samples will be collected at ASR Well No. 1 every cycle. The components of the water quality monitoring program for the ASR pilot testing program are described below. Pre-injection groundwater, source water, and recovered water will be sampled at various times throughout each cycle, as shown in Table 2.

Historically, water quality samples (pre-injection groundwater, source water, and recovered water) were analyzed for most, if not all, of the following: field parameters, common ions, metals, DBPs, qualitative and quantitative microbial testing, synthetic organic compounds (SOCs), volatile organic compounds (VOCs), radionuclides, and all other constituents of the SDWA in almost every cycle. In agreement with the Oregon Health Authority (OHA) Drinking Water Services (DWS), the City reduced the water quality sampling program based on the previous limited water quality detections, none of which posed a risk to human health. The current and approved program outlined below continues to protect human health, meets or exceeds OHA's DWS requirements, and meets the objectives previously stated.

1.3.1 Source Water and Pre-Injection Groundwater Quality

As outlined in Table 2, source water and pre-injection groundwater will be analyzed before the initiation of every ASR cycle. Source water will be monitored for field parameters, geochemical constituents, metals, miscellaneous constituents, and DBPs listed in Table 3. Pre-injection groundwater will be monitored for field parameters and DBPs listed in Table 4.

DBPs will be tested in source water during the initial, 50 percent, and 95 percent samples, or on a quarterly basis if sampling occurs more frequently than every 3 months. An additional source water sample will be collected at the end of the injection period for the same analytes as the initial source water sample (Table 2).

1.3.2 Recovered Water Quality

Three recovered water samples will be collected every cycle: an initial sample, a 50 percent sample, and a 95 percent sample. Each recovered water sample will be analyzed for the analyte groups outlined in Table 2, with the detailed analyte list provided in Table 4.

Given that SOCs will be analyzed for 2 consecutive quarters every 3 years, VOCs will be tested every 3 years, and radionuclides will be analyzed every 6 years, the constituents analyzed in the recovered water samples vary from cycle to cycle. The outline in Table 2 aligns with OHA's DWS online schedule.

1.3.3 Contingency Plan

In the event that the quality of the water being injected becomes impaired or the recovered water is unacceptable, all of the water injected into the aquifer will need to be recovered and pumped to the City's storm drainage system. The overflow system is adequately sized to dispose of the recovered water. That situation is unlikely to occur given the water quality analysis conducted for the City's ASR feasibility study (MSA, 2001) and GSI Water Solutions, Inc.'s experience with other Columbia River Basalt Group ASR systems in the area.

1.4 ASR Testing Schedule

The general schedule for each testing cycle is as follows:

- Injection: Approximately November or December through May or June (estimated 75 to 160 days)
- Recovery: Approximately May or June through September or October (estimated 75 to 160 days based on recovery rate and demand)

The injection period and the actual volumes of injected water may change depending on the turbidity of the injection source water and potential down time during injection. Likewise, the start of recovery will be contingent on the volume of water that was injected, peaking water needs for the City, and water cost and availability of the source injection water from the Portland Water Bureau.

The results of each cycle of ASR testing will be evaluated and used to optimize ASR Well No. 1 operation for subsequent years. Not all of the stored water may be recovered in any given year if there is insufficient demand for the water. The volume of water available for recovery remaining in the ASR storage account and carried over from year to year will be reduced by 5 percent each year that it is not recovered.

2. ASR Testing Reporting

Target ASR volumes, rates, durations, and schedules will be developed on the basis of the previous cycle results and City's needs for the upcoming water year. Reporting will be performed on the basis of the conditions outlined in the ASR limited license, including any modifications to ASR Well No. 1 or the ASR system. Any modifications to the sampling and monitoring plan will be submitted to the OWRD for review and approval.

3. Reference

MSA. 2001. *Aquifer Storage and Recovery (ASR) Feasibility Evaluation*. Prepared for the City of Tualatin. Prepared by Murray, Smith & Associates, Inc. in association with GSI Water Solutions, Inc. July 2001.

Tables

This page intentionally left blank.

Table 1. Observation Well Network Construction Details

Well	Location	Owner	Approximate Surface Elevation [1] (feet)	Total Depth [2] (feet)	Diameter (inches)	Pump Installed	Comments
Storage or Deep Monitoring Wells							
Exploratory Well WASH 58802	T2S, R1W, 34, SE of NE 22675 SW 108th Avenue	City of Tualatin	345	1005	8	No	ASR Pilot well; electronic pressure transducer installed.
Tualatin High School Well WASH 53823	T2S, R1W, 35, NW of NE 22300 SW Boones Ferry Rd	Tigard-Tualatin School District	310	627	8	Yes	Used for irrigation in summer; well deepened in 1998 (WASH 53823). Original well log is WASH 1694. Electronic pressure transducer installed.
Shallow Zone Monitoring Wells [3] (completed above ASR Well No. 1 seal elevation)							
Shallow Basalt Well WASH 3331	T2S, R1W, 34, SE of NE 22675 SW 108th Avenue	City of Tualatin	345	320	4	No	Existing inactive domestic well located at ASR well site; pump has been removed. Electronic pressure transducer installed.
Tri-County Gun Club Well WASH 73811	T2S, R1W, 33, NW of SE 14198 SW Tonquin Road	Tri-County Gun Club	235	420	6	Yes	Installed in July 2015 to replace WASH 1847; well deepened in 2020 (WASH 79009).

Notes

[1] Elevation datum: WSG84 geoid mean sea level. Elevations estimated to nearest +/-5 feet from Google Earth™. Elevations at ASR well based on Washington County survey control point at SW 108th Avenue and SW Cottonwood Street.

[2] Depths are those reported in Oregon Water Resources Department Water Well Reports.

[3] ASR No. 1 and pilot well annular seal elevations are approximately -140 feet mean sea level.

ASR = aquifer storage and recovery

OWRD = Oregon Water Resources Division

Table 2. Summary of Water Quality Sampling Program

Sample Location (ASR Cycle)	Water Year	Injection (see Table 3. Source Water Analytical List)				Recovery (see Table 4. Recovery Water Analytical List)							
		Field Parameters[1]	Turbidity	Geochemical, Metals, Misc.	DBPs	Field Parameters[1]	Bacteriological, Geochemical	Metals and Misc.	DBPs	Microbial[2]	Radionuclides	SOCs	VOCs
Source Water	Every year	Initial, 50% and 95% [3]	Continuous	Start, 95%	Initial, 50% and 95% [3,4]	--	--	--	--	--	--	--	--
ASR Well No. 1 (Cycle 16)	2024	Prior to injection	--	--	Prior to injection	Continuous	Initial, 50%, 95%[3]	50%	Initial, 50%, 95% [3,4]	Initial	--	--	--
ASR Well No. 1 (Cycle 17)	2025	Prior to injection	--	--	Prior to injection	Continuous	Initial, 50%, 95%[3]	50%	Initial, 50%, 95% [3,4]	Initial	--	--	--
ASR Well No. 1 (Cycle 18)	2026	Prior to injection	--	--	Prior to injection	Continuous	Initial, 50%, 95%[3]	50%	Initial, 50%, 95% [3,4]	Initial	--	Initial, 90% [3,5]	50%
ASR Well No. 1 (Cycle 19)	2027	Prior to injection	--	--	Prior to injection	Continuous	Initial, 50%, 95%[3]	50%	Initial, 50%, 95% [3,4]	Initial	--	--	--
ASR Well No. 1 (Cycle 20)	2028	Prior to injection	--	--	Prior to injection	Continuous	Initial, 50%, 95%[3]	50%	Initial, 50%, 95% [3,4]	Initial	--	--	--

Notes

[1] Field parameters continuously monitored inline include turbidity, pH, specific conductance, and free and total chlorine. Temperature, oxidation-reduction potential, and dissolved oxygen will be measured when water quality sample is collected.

[2] Microbial sample indicates a quantitative analysis of biological population using Water Systems Engineering laboratories in Ottawa, Kansas.

[3] Initial indicates start of the injection or recovery pumping.

[4] DPBs sampled on a quarterly basis; if sampling occurs more frequently than every 3 months, DPBs may not be analyzed.

[5] SOCs need to be sampled 2 consecutive quarters every 3 years.

-- = no sample or not applicable

DBPs = disinfection by-products

Metals and Misc. = inorganic compounds, secondary drinking water standards, and future regulated contaminants (i.e., radon, perchlorate)

SOCs = synthetic organic compounds

VOCs = volatile organic compounds

Sampling program is based on the current Oregon Health Authority (OHA) schedule listed on the OHA's Drinking Water Services data access website for the City of Tualatin, along with revisions by Gregg Baird (OHA) on February 26, 2014.

Table 3. Source Water Analytical List

Analyte Group	Analyte[1]	Lowest Regulatory Standard	Units	Regulatory Criteria	MDL
Disinfection By-Products	Chloroform (Trichloromethane)	None	mg/L	None	0.0005
	Bromodichloromethane	None	mg/L	None	0.0005
	Dibromochloromethane	None	mg/L	None	0.0005
	Bromoform (Tribromomethane)	None	mg/L	None	0.0005
	Total Trihalomethanes	0.08	mg/L	MCL	--
	Monochloroacetic Acid	None	mg/L	None	0.002
	Dichloroacetic Acid	None	mg/L	None	0.001
	Trichloroacetic Acid	None	mg/L	None	0.001
	Monobromoacetic Acid	None	mg/L	None	0.001
	Dibromoacetic Acid	None	mg/L	None	0.001
	Total Haloacetic Acids	0.06	mg/L	MCL	--
	Chlorite	1	mg/L	MCL	NA
	Bromate	0.01	mg/L	MCL	NA
Field Parameters	Temperature	None	degrees Celsius	None	NA
	Conductivity	None	µS/cm	None	NA
	Dissolved Oxygen	None	mg/L	None	NA
	pH	6 - 8.5	Units	SMCL	NA
	Turbidity	None	NTU	None	NA
	Oxidation Reduction Potential	None	mV	None	NA
Geochemical	Bicarbonate	None	mg/L	None	2
	Calcium	None	mg/L	None	0.1
	Carbonate	None	mg/L	None	2
	Chloride	250	mg/L	SMCL	1
	Magnesium	None	mg/L	None	0.05
	Nitrate as N	10	mg/L	MCL	0.5
	Nitrite as N	1	mg/L	MCL	0.01
	Potassium	None	mg/L	None	0.1
	Sodium	None	mg/L	None	0.05
	Sulfate	250	mg/L	SMCL	5
	Total Alkalinity	None	mg/L	None	2
	Total Dissolved Solid	500	mg/L	SMCL	0.7
	Total Organic Carbon	None	mg/L	None	0.5
Metals	Iron (Total)	0.3	mg/L	SMCL	0.05
	Iron (Dissolved)	None	mg/L	None	0.05
	Manganese (Total)	0.05	mg/L	SMCL	0.002
	Manganese (Dissolved)	None	mg/L	None	0.002
Miscellaneous	Odor	3	TON	SMCL	1.00
	Color	15	CU	SMCL	5.00

Notes

[1] Samples are unfiltered unless noted (i.e., dissolved).

-- = not applicable

µS/cm = microSiemens per centimeter

CU = color unit

MCL = federal maximum contaminant level for drinking water

MDL = method detection limit

mg/L = milligrams per liter

mV = millivolts

NA = not applicable

NTU = nephelometric turbidity units

SMCL = federal secondary maximum contaminant levels for drinking water

TON = threshold odor number

Table 4. Pre-Injection Groundwater and Recovered Water Analytical List

Analyte Group	Analyte[1]	Lowest Regulatory Standard	Units	Regulatory Criteria	MDL
Bacteriological	Fecal Coliforms/E.Coli	<1/100 mL	cfu/100 mL	MML	--
	Total Coliform	<1/100 mL	cfu/100 mL	MML	--
Disinfection By-Product	Chloroform (Trichloromethane)	None	mg/L	None	0.0005
	Bromodichloromethane	None	mg/L	None	0.0005
	Dibromochloromethane	None	mg/L	None	0.0005
	Bromoform (Tribromomethane	None	mg/L	None	0.0005
	Total Trihalomethanes	0.08	mg/L	MCL	--
	Monochloroacetic Acid	None	mg/L	None	0.002
	Dichloroacetic Acid	None	mg/L	None	0.001
	Trichloroacetic Acid	None	mg/L	None	0.001
	Monobromoacetic Acid	None	mg/L	None	0.001
	Dibromoacetic Acid	None	mg/L	None	0.001
	Total Haloacetic Acids	0.06	mg/L	MCL	--
	Chlorite	1	mg/L	MCL	NA
	Bromate	0.01	mg/L	MCL	NA
Field Parameters	Temperature	None	degrees Celsius	None	NA
	Conductivity	None	µS/cm	None	NA
	Dissolved Oxygen	None	mg/L	None	NA
	pH	6 - 8.5	Units	SMCL	NA
	Turbidity	None	NTU	None	NA
	Oxidation Reduction Potential	None	mV	None	NA
Geochemical	Bicarbonate	None	mg/L	None	2
	Calcium	None	mg/L	None	0.1
	Carbonate	None	mg/L	None	2
	Chloride	250	mg/L	SMCL	1
	Magnesium	None	mg/L	None	0.05
	Nitrate as N	10	mg/L	MCL	0.5
	Nitrite as N	1	mg/L	MCL	0.01
	Potassium	None	mg/L	None	0.1
	Sodium	None	mg/L	None	0.05
	Sulfate	250	mg/L	SMCL	5
	Total Alkalinity	None	mg/L	None	2
	Total Dissolved Solid	500	mg/L	SMCL	0.7
	Total Organic Carbon	None	mg/L	None	0.5
Metals	Aluminum	0.05	mg/L	SMCL	0.05
	Antimony	0.006	mg/L	MCL	0.001
	Arsenic	0.01	mg/L	MCL	0.002
	Barium	2	mg/L	MCL	0.05
	Beryllium	0.004	mg/L	MCL	0.0005
	Cadmium	0.005	mg/L	MCL	0.001
	Chromium	0.1	mg/L	MCL	0.002
	Copper	1.3	mg/L	MCL	0.005
	Iron (Total)	0.3	mg/L	SMCL	0.05
	Iron (Dissolved)	None	mg/L	None	0.05

Table 4. Pre-Injection Groundwater and Recovered Water Analytical List

Analyte Group	Analyte[1]	Lowest Regulatory Standard	Units	Regulatory Criteria	MDL
Metals	Lead	0.015	mg/L	MCL	0.001
	Manganese (Total)	0.05	mg/L	SMCL	0.002
	Manganese (Dissolved)	None	mg/L	None	0.002
	Mercury	0.002	mg/L	MCL	0.0004
	Nickel	0.1	mg/L	MCL	0.004
	Selenium	0.05	mg/L	MCL	0.002
	Silver	0.1	mg/L	SMCL	0.005
	Thallium	0.002	mg/L	MCL	0.0006
	Zinc	5	mg/L	SMCL	0.01
Miscellaneous	Color	15	CU	SMCL	5.00
	Corrosivity (Langelier Saturation Index)	Non-Corrosive	mg/L	SMCL	--
	Cyanide (as free cyanide)	0.2	mg/L	MCL	--
	Fluoride	4	mg/L	MCL	0.5
	Hardness (as CaCO3)	None	mg/L	None	4
	Methylene Blue Active Substance	0.5	mg/L	SMCL	0.05
	Odor	3	TON	SMCL	1
	Perchlorate	None	mg/L	None	NA[2]
	Radon	None	pCi/L	None	NA[2]
	Total Nitrate-Nitrite	10	mg/L	MML	--
Radionuclides	Combined Radium 226/228	5	pCi/L	MCL	--
	Uranium	0.03	mg/L	MCL	--
	Gross Alpha	15	pCi/L	MCL	1.79
Synthetic Organic Compounds	2,4,5-TP (Silvex)	0.05	mg/L	MCL	0.0004
	2,4-D	0.07	mg/L	MCL	0.0002
	Alachlor (Lasso)	0.002	mg/L	MCL	0.0004
	Atrazine	0.003	mg/L	MCL	0.0002
	Benzo(a)Pyrene	0.0002	mg/L	MCL	0.00004
	BHC-gamma (Lindane)	0.0002	mg/L	MCL	0.00002
	Carbofuran	0.04	mg/L	MCL	0.001
	Chlordane	0.002	mg/L	MCL	0.0004
	Dalapon	0.2	mg/L	MCL	0.002
	Di(2-ethylhexyl)adipate (adipates)	0.4	mg/L	MCL	0.001
	Di(2-ethylhexyl)phthalate (phthalates)	0.006	mg/L	MCL	0.001
	Dibromochloropropane (DBCP)	0.0002	mg/L	MCL	0.00002
	Dinoseb	0.007	mg/L	MCL	0.0004
	Diquat	0.02	mg/L	MCL	0.0004
	Ethylene Dibromide (EDB)	0.00005	mg/L	MCL	0.00001
	Endothall	0.1	mg/L	MCL	0.01
	Endrin	0.002	mg/L	MCL	0.00002
	Glyphosate	0.7	mg/L	MCL	0.01

Table 4. Pre-Injection Groundwater and Recovered Water Analytical List

Analyte Group	Analyte[1]	Lowest Regulatory Standard	Units	Regulatory Criteria	MDL
Synthetic Organic Compounds	Heptachlor	0.0004	mg/L	MCL	0.00004
	Heptachlor Epoxide	0.0002	mg/L	MCL	0.00002
	Hexachlorobenzene (HCB)	0.001	mg/L	MCL	0.0001
	Hexachlorocyclopentadiene	0.05	mg/L	MCL	0.0002
	Methoxychlor	0.04	mg/L	MCL	0.0002
	Polychlorinated Biphenyls (PCB	0.0005	mg/L	MCL	0.0002
	Pentachlorophenol	0.001	mg/L	MCL	0.00008
	Picloram	0.5	mg/L	MCL	0.0002
	Simazine	0.004	mg/L	MCL	0.0001
	Toxaphene	0.003	mg/L	MCL	0.001
	Vydate (Oxamyl)	0.2	mg/L	MCL	0.002
Volatile Organic Compounds	1,1,1-Trichloroethane	0.2	mg/L	MCL	0.0005
	1,1,2-Trichloroethane	0.005	mg/L	MCL	0.0005
	1,1-Dichloroethylene	0.007	mg/L	MCL	0.0005
	1,2,4-Trichlorobenzene	0.07	mg/L	MCL	0.0005
	1,2-Dichlorobenzene (o)	0.6	mg/L	MCL	0.0005
	1,2-Dichloroethane	0.005	mg/L	MCL	0.0005
	1,2-Dichloropropane	0.005	mg/L	MCL	0.0005
	1,4-Dichlorobenzene (p)	0.075	mg/L	MCL	0.0005
	Benzene	0.005	mg/L	MCL	0.0005
	Carbon Tetrachloride	0.005	mg/L	MCL	0.0005
	Chlorobenzene	0.1	mg/L	MCL	0.0005
	cis-1,2-Dichloroethylene	0.07	mg/L	MCL	0.0005
	Dichloromethane (methylene chloride)	0.005	mg/L	MCL	0.0005
	Ethylbenzene	0.7	mg/L	MCL	0.0005
	Styrene	0.1	mg/L	MCL	0.0005
	Tetrachloroethylene	0.005	mg/L	MCL	0.0005
	Toluene	1	mg/L	MCL	0.0005
	trans-1,2-Dichloroethylene	0.1	mg/L	MCL	0.0005
	Trichloroethylene	0.005	mg/L	MCL	0.0005
	Vinyl chloride	0.002	mg/L	MCL	0.0005
	Total Xylenes	10	mg/L	MCL	0.0005

Notes

[1] Samples are unfiltered unless noted (i.e., dissolved).

[2] MDL will be dependent on EPA final rule and date rule becomes effective.

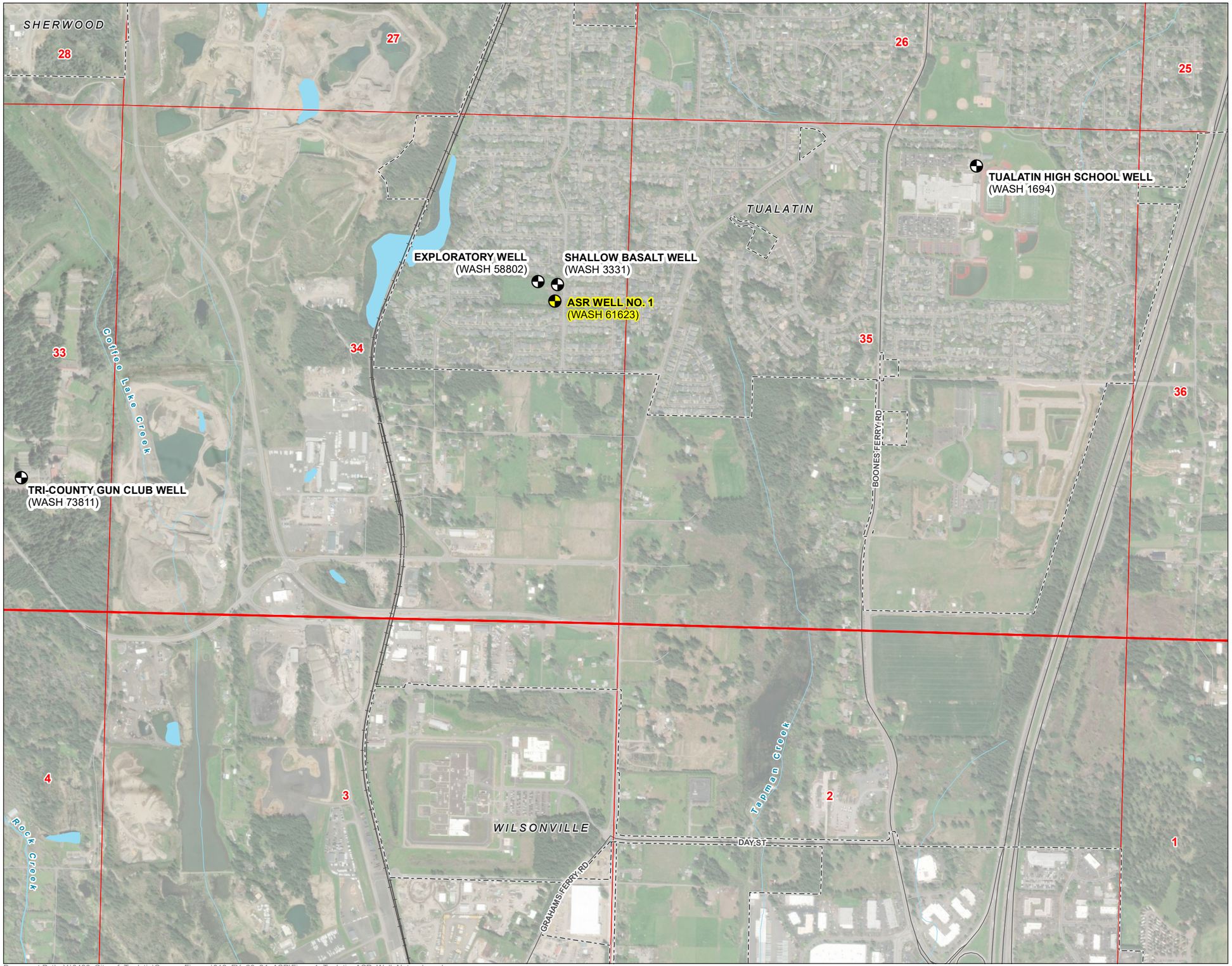
-- = not applicable
µS/cm = microSiemens per centimeter
CFU = colony forming unit
CU = color unit
EPA = U.S. Environmental Protection Agency
MCL = federal maximum contaminant level for drinking water
MDL = method detection limit
mg/L = milligrams per liter
mL = milliliter
MML = Oregon Department of Environmental Quality's maximum measurable levels for groundwater
mV = millivolts
NA = not applicable
NTU = nephelometric turbidity units
pCi/L = picocuries per liter
SMCL = federal secondary maximum contaminant levels for drinking water
TON = threshold odor number

Figure

FIGURE 1

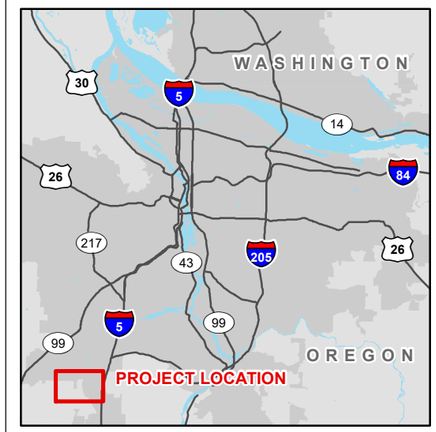
Site Map

ASR Limited License #010
Monitoring Plan for
Water Years 2024-2028



LEGEND

- ASR Well
- Observation Well
- City Limit
- Major Road
- Railroad
- Watercourse
- Waterbody



N

0 500 1,000 1,500
Feet

Date: August 25, 2023
Data Sources: METRO RLIS,
Maxar Imagery (2020)

GSI Water Solutions, Inc.

Document Path: Y:\0498_City_of_Tualatin\Source_Figures\012_FY_23_24_ASR\Figure1_Tualatin_ASR_Well_Network.mxd

Attachment A

Oregon Water Resources Department
Water Well Reports

STATE OF OREGON
WATER WELL REPORT
(as required by ORS 537.765)

WASH 1694

RECEIVED
OCT - ? 1992
WATER RESOURCES DEPT
SALEM, OREGON

2S/1W/35ab

(START CARD) # 45183

(1) OWNER: Well Number
Name Tigard-Twalation School Dist#23J
Address 13137 SW Pacific Hwy
City Tigard State OR. Zip 97223

(2) TYPE OF WORK:
☒ New Well ☐ Deepen ☐ Recondition ☐ Abandon

(3) DRILL METHOD:
☒ Rotary Air ☐ Rotary Mud ☐ Cable
☐ Other

(4) PROPOSED USE:
☐ Domestic ☐ Community ☐ Industrial ☒ Irrigation
☐ Thermal ☐ Injection ☐ Other

(5) BORE HOLE CONSTRUCTION:
Special Construction approval ☐ Yes ☒ No Depth of Completed Well 400 ft.
Explosives used ☐ Yes ☒ No Type Amount

HOLE Diameter	From	To	SEAL Material	From	To	Amount sacks or pounds
10	0	178	cement	0	178	36
8	178	400				

How was seal placed: Method ☐ A ☐ B ☐ C ☐ D ☐ E
☐ Other filled from the bottom up
Backfill placed from ft. to ft. Material
Gravel placed from ft. to ft. Size of gravel

(6) CASING/LINER:

	Diameter	From	To	Gauge	Steel	Plastic	Welded	Threaded
Casing:	8	+2	178	250	☒	☐	☒	☐
					☐	☐	☐	☐
					☐	☐	☐	☐
					☐	☐	☐	☐
Liner:					☐	☐	☐	☐
					☐	☐	☐	☐

Final location of shoe(s)

(7) PERFORATIONS/SCREENS:
☐ Perforations Method
☐ Screens Type Material

From	To	Slot size	Number	Diameter	Tele/pipe size	Casing	Liner
						☐	☐
						☐	☐
						☐	☐
						☐	☐
						☐	☐

(8) WELL TESTS: Minimum testing time is 1 hour
☒ Pump ☐ Bailer ☐ Air ☐ Flowing Artesian

Yield gal/min	Drawdown	Drill stem at	Time
150	100	380	xxx 5hr.

Temperature of Water 54 Depth Artesian Flow Found
Was a water analysis done? ☐ Yes By whom
Did any strata contain water not suitable for intended use? ☐ Too little
☐ Salty ☐ Muddy ☐ Odor ☐ Colored ☐ Other
Depth of strata:

(9) LOCATION OF WELL by legal description:
County Wash. Latitude Longitude
Township 2 N or S. Range 1 E or W. WM.
Section 35 NW ¼ NE ¼
Tax Lot Lot Block Subdivision
Street Address of Well (or nearest address) Boonsfreey RD.

(10) STATIC WATER LEVEL:
149 ft. below land surface. Date 9/24/92
Artesian pressure lb. per square inch. Date

(11) WATER BEARING ZONES:
Depth at which water was first found 65

From	To	Estimated Flow Rate	SWL
61	78	5	60
145	165	75	89
220	400	150	149

(12) WELL LOG:
Ground elevation

Material	From	To	SWL
top soil	0	1	
clay brown	1	12	
clay gray/brown	12	15	
rock gray broken	15	25	
rock clay gray/brown	25	35	
rock gray	35	61	
rock brown/gray	61	78	
rock gray	78	119	
rock gray/red	119	125	
rock gray	125	139	
rock gray/green	139	145	
rock gray/green/brown	145	165	
rock gray	165	188	
rock gray/green	188	219	
rock gray/brown/yellow	219	232	
rock gray	232	340	
rock gray/red/green	340	358	
rock gray/green	358	372	
rock gray	372	381	
rock gray/red/green cindery	381	390	
rock gray	390	400	

Date started 9/21/92 Completed 9/24/92

(unbonded) Water Well Constructor Certification:
I certify that the work I performed on the construction, alteration, or abandonment of this well is in compliance with Oregon well construction standards. Materials used and information reported above are true to my best knowledge and belief.

WWC Number
Signed Date

(bonded) Water Well Constructor Certification:
I accept responsibility for the construction, alteration, or abandonment work performed on this well during the construction dates reported above. All work performed during this time is in compliance with Oregon well construction standards. This report is true to the best of my knowledge and belief.

WWC Number 663
Signed Rodney C. Eden Date 9/30/92

ORIGINAL & FIRST COPY - WATER RESOURCES DEPARTMENT SECOND COPY - CONSTRUCTOR THIRD COPY - CUSTOMER 9809C 10/91

STATE OF OREGON

WATER WELL REPORT

(as required by ORS 537.765)

Wash 333

RECEIVED

AUG 10 1993

WATER RESOURCES DEPT.
SALEM, OREGON

2S/1W/34dd

(START CARD) # 52439

(1) OWNER: Well Number

Name City of Tualatin

Address 18880 SW Martinazzi Ave.

City Tualatin State OR Zip 97062

(2) TYPE OF WORK:

[X] New Well [ ] Deepen [ ] Recondition [ ] Abandon

(3) DRILL METHOD:

[X] Rotary Air [ ] Rotary Mud [ ] Cable

[ ] Other

(4) PROPOSED USE:

[X] Domestic [ ] Community [ ] Industrial [ ] Irrigation

[ ] Thermal [ ] Injection [ ] Other

(5) BORE HOLE CONSTRUCTION:

Special Construction approval [ ] Yes [X] No Depth of Completed Well 320 ft.

Explosives used [ ] Yes [X] No Type Amount

HOLE Diameter	From	To	SEAL Material	From	To	Amount sacks or pounds
8	0	54	cement	0	54	15 sks
6	54	320				

How was seal placed: Method [ ] A [X] B [ ] C [ ] D [ ] E

[ ] Other

Backfill placed from ft. to ft. Material

Gravel placed from ft. to ft. Size of gravel

(6) CASING/LINER:

	Diameter	From	To	Gauge	Steel	Plastic	Welded	Threaded
Casing:	6	+1	54	.250	[X]	[ ]	[X]	[ ]
					[ ]	[ ]	[ ]	[ ]
					[ ]	[ ]	[ ]	[ ]
					[ ]	[ ]	[ ]	[ ]
Liner:	4	0	320	sl 160	[ ]	[X]	[X]	[ ]
					[ ]	[ ]	[ ]	[ ]

Final location of shoe(s)

(7) PERFORATIONS/SCREENS:

[X] Perforations Method skilsaw

[ ] Screens Type Material

From	To	Slot size	Number	Diameter	Tele/pipe size	Casing	Liner
220	280	.1x6	150			[ ]	[X]
300	320	.1x6	100			[ ]	[X]
						[ ]	[ ]
						[ ]	[ ]
						[ ]	[ ]

(8) WELL TESTS: Minimum testing time is 1 hour

[ ] Pump [ ] Bailer [X] Air [ ] Flowing Artesian

Yield gal/min	Drawdown	Drill stem at	Time
15		320	1 hr.

Temperature of Water ~ 55°F Depth Artesian Flow Found

Was a water analysis done? [ ] Yes By whom

Did any strata contain water not suitable for intended use? [ ] Too little

[ ] Salty [ ] Muddy [ ] Odor [ ] Colored [ ] Other

Depth of strata:

(9) LOCATION OF WELL by legal description:

County Washington Latitude Longitude

Township 2S N or S. Range 1W E or W. WM.

Section 34 SE ¼ of NE ¼

Tax Lot 1001 Lot Block Subdivision

Street Address of Well (or nearest address) 22675 SW 108th Tualatin, OR 97062

(10) STATIC WATER LEVEL:

127 ft. below land surface. Date 7/30/93

Artesian pressure lb. per square inch. Date

(11) WATER BEARING ZONES:

Depth at which water was first found approx. 40

From	To	Estimated Flow Rate	SWL
SWL	320	see (8)	see (10)

(12) WELL LOG:

Ground elevation approx. 340

Material	From	To	SWL
Top soil	0	3	
Clay, brown	3	32	
SS, gray, frac	32	39	
Basalt, brn, frac, some ves	39	45	
Basalt, gray, hard	45	65	
Basalt, gray & brn, med, frac	65	69	
Basalt, red, soft, ves, bkn, cinder	69	77	
Basalt, gray & brn, med, ves	77	84	
Basalt, gray-blk & brn, med-hd, frac	84	140	
Basalt, red, med, frac, cindery	140	147	
Basalt, gray & blk, frac	147	158	
Basalt, red & brn, bkn, ves	158	171	
Bslt, gry&red&brn, med-soft, v. frac	171	185	
Basalt, gray, hard	185	209	
Basalt, brn & red, bkn, ves, sft	209	230	
Basalt, gray, med-hd, some frac	230	254	
Basalt, blk & gray, med, v.frac	254	265	
Basalt, dk gray, some frac	265	303	
Basalt, dk red, bkn, ves	303	315	
Basalt, dk gray, some frac	315	320	

Date started 7/27/93 Completed 7/30/93

(unbonded) Water Well Constructor Certification:

I certify that the work I performed on the construction, alteration, or abandonment of this well is in compliance with Oregon well construction standards. Materials used and information reported above are true to my best knowledge and belief.

Signed Donald D. Davis WWC Number 1085

Date 8/2/93

(bonded) Water Well Constructor Certification:

I accept responsibility for the construction, alteration, or abandonment work performed on this well during the construction dates reported above. All work performed during this time is in compliance with Oregon well construction standards. This report is true to the best of my knowledge and belief.

Signed Stephen D. Richards WWC Number 649

Date 8/2/93

ORIGINAL & FIRST COPY - WATER RESOURCES DEPARTMENT SECOND COPY - CONSTRUCTOR THIRD COPY - CUSTOMER 9809C 10/91

Wash 53823

Well ID# L14892

STATE OF OREGON
WATER SUPPLY WELL REPORT
(as required by ORS 537.765)

(START CARD) # 102386

Instructions for completing this report are on the last page of this form.

(1) OWNER: Well Number ____
Name Tigard-Tualatin School District 23J
Address 13137 SW Pacific Hwy
City Tigard State OR Zip 97223

(2) TYPE OF WORK
☐ New Well ☒ Deepening ☐ Alteration (repair/recondition) ☐ Abandonment

(3) DRILL METHOD:
☒ Rotary Air ☐ Rotary Mud ☐ Cable ☐ Auger
☐ Other ____

(4) PROPOSED USE:
☐ Domestic ☐ Community ☐ Industrial ☒ Irrigation
☐ Thermal ☐ Injection ☐ Livestock ☐ Other ____

(5) BORE HOLE CONSTRUCTION:
Special Construction approval ☐ Yes ☒ No Depth of Completed Well 627 ft.
Explosives used ☐ Yes ☒ No Type ____ Amount ____

HOLE Diameter	From	To	SEAL Material	From	To	Sacks or pounds
8	400	627	NOT CHANGED			

How was seal placed: Method ☐ A ☐ B ☐ C ☐ D ☐ E
☐ Other ____
Backfill placed from ____ ft. to ____ ft. Material ____
Gravel placed from ____ ft. to ____ ft. Size of gravel ____

(6) CASING/LINER:

	Diameter	From	To	Gauge	Steel	Plastic	Welded	Threaded
Casing:	NOT CHANGED				☐	☐	☐	☐
					☐	☐	☐	☐
					☐	☐	☐	☐
					☐	☐	☐	☐
Liner:					☐	☐	☐	☐
					☐	☐	☐	☐

Final location of shoe(s) ____

(7) PERFORATIONS/SCREENS:
☐ Perforations Method ____
☐ Screens Type ____ Material ____

From	To	Slot size	Number	Diameter	Tele/pipe size	Casing	Liner
						☐	☐
						☐	☐
						☐	☐
						☐	☐
						☐	☐

(8) WELL TESTS: Minimum testing time is 1 hour
☐ Pump ☐ Bailer ☒ Air ☐ Flowing Artesian

Yield gal/min	Drawdown	Drill stem at	Time
200+		627	1 hr.
200		527	1 hr.
180		427	0.75 hr.
150		327	

Temperature of water ~55°F Depth Artesian Flow Found 0.75 hr.
Was a water analysis done? ☐ Yes By whom ____
Did any strata contain water not suitable for intended use? ☐ Too little
☐ Salty ☐ Muddy ☐ Odor ☐ Colored ☐ Other ____
Depth of strata: ____

(9) LOCATION OF WELL by legal description:
County Wash Latitude ____ Longitude ____
Township 2S N or S Range 1W E or W. WM.
Section 35 NW 1/4 NE 1/4
Tax Lot 700 Lot ____ Block ____ Subdivision ____
Street Address of Well (or nearest address) 22300 SW Boones Ferry Rd. Tualatin, OR. 97062

(10) STATIC WATER LEVEL:
174 ft. below land surface. Date 7/17/98
Artesian pressure ____ lb. per square inch. Date ____

(11) WATER BEARING ZONES:
Depth at which water was first found 421

From	To	Estimated Flow Rate	SWL
421	436	~100	see(10)
518	575	~100+	see(10)

(12) WELL LOG:
Ground Elevation ~300'

Material	From	To	SWL
Basalt, grey & red, ves	400	406	
Basalt, grey, hard	406	421	
Basalt, black, bkn, ves	421	427	
Basalt, black-red, bkn, ves	427	436	
Basalt, grey, hd,occ.frac/ves	436	518	
Basalt, black,bkn, soft	518	521	
Sandstone, grey, hd, frac	521	526	
Basalt, blk, ves, soft	526	530	
Basalt, grey, m-h, some ves	530	542	
Basalt, grey w/brn, bkn, ves, med	542	550	
Basalt, grey, frac, m-h	550	555	
Basalt, blk & red, bkn,w/grn c.s.	555	575	
Basalt, grey, frac, m-h			

RECEIVED
AUG 04 1998
WATER RESOURCES DEPT.
SALEM, OREGON

Date started 6/24/98 Completed 7/14/98

(unbonded) Water Well Constructor Certification:
I certify that the work I performed on the construction, alteration, or abandonment of this well is in compliance with Oregon water supply well construction standards. Materials used and information reported above are true to the best of my knowledge and belief.
WWC Number 1578
Signed ____ Date 7/30/98

(bonded) Water Well Constructor Certification:
I accept responsibility for the construction, alteration, or abandonment work performed on this well during the construction dates reported above. All work performed during this time is in compliance with Oregon water supply well construction standards. This report is true to the best of my knowledge and belief.
WWC Number 649
Signed Stephen Schneider Date 7/30/98

ORIGINAL & FIRST COPY-WATER RESOURCES DEPARTMENT SECOND COPY-CONSTRUCTOR THIRD COPY-CUSTOMER

WASH 58802

STATE OF OREGON
WATER SUPPLY WELL REPORT
(as required by ORS 537.765)
Instructions for completing this report are on the last page of this form.

(WELL I.D.)# L 57935
(START CARD) # 143357

(1) OWNER: Well Number
Name **City of Tualatin**
Address **18880 SW Martinazzi**
City **Tualatin** State **OR** Zip **97062**

(2) TYPE OF WORK
☑ New Well ☐ Deepening ☐ Alteration (repair/recondition) ☐ Abandonment

(3) DRILL METHOD:
☑ Rotary Air ☐ Rotary Mud ☐ Cable ☐ Auger
☑ Other **Reverse Circulation Rotary**

(4) PROPOSED USE:
☐ Domestic ☐ Community ☐ Industrial ☐ Irrigation
☐ Thermal ☐ Injection ☐ Livestock ☑ Other **ASR explor.**

(5) BORE HOLE CONSTRUCTION:
Special Construction approval ☐ Yes ☑ No Depth of Completed Well **1005** ft.
Explosives used ☐ Yes ☑ No Type _____ Amount _____

HOLE Diameter	From	To	SEAL Material	From	To	Sacks or pounds
12	0	34	cement	0	486	129 sks
10	34	489				
8	489	1070				

How was seal placed: Method ☐ A ☑ B ☑ C ☐ D ☐ E
☐ Other
Backfill placed from ____ ft. to ____ ft. Material
Gravel placed from ____ ft. to ____ ft. Size of gravel

(6) CASING/LINER:

	Diameter	From	To	Gauge	Steel	Plastic	Welded	Threaded
Casing:	8	+2	486	1/4	☑	☐	☑	☐
					☐	☐	☐	☐
					☐	☐	☐	☐
					☐	☐	☐	☐
Liner:					☐	☐	☐	☐
					☐	☐	☐	☐

Final location of shoe(s) 486–488

(7) PERFORATIONS/SCREENS:
☐ Perforations Method
☐ Screens Type Material

From	To	Slot size	Number	Diameter	Tele/pipe size	Casing	Liner
						☐	☐
						☐	☐
						☐	☐
						☐	☐
						☐	☐

(8) WELL TESTS: Minimum testing time is 1 hour
☑ Pump ☐ Bailer ☐ Air ☐ Flowing Artesian

Yield gal/min	Drawdown	Drill stem at	Time
100	11		1 hr.
250	30		2nd hr
350	49		3rd hr

Temperature of water **approx 55F** Depth Artesian Flow Found
Was a water analysis done? ☐ Yes By whom
Did any strata contain water not suitable for intended use? ☐ Too little
☐ Salty ☐ Muddy ☐ Odor ☐ Colored ☑ Other **high TDS**
Depth of strata: **1056 to bottom**

(9) LOCATION OF WELL by legal description:
County **Washington** Latitude Longitude
Township **2** S Range **1** W WM.
Section **34** **SE** 1/4 **NE** 1/4
Tax Lot **5500** Lot Block Subdivision
Street Address of Well (or nearest address) **22675 SW 108th Avenue**
Tualatin, OR 97062

(10) STATIC WATER LEVEL:
258 ft. below land surface. Date **8/19/02**
Artesian pressure lb. per square inch. Date

(11) WATER BEARING ZONES:
Depth at which water was first found **245**

From	To	Estimated Flow Rate	SWL
245	258	20	NM
296	317	20	NM
331	356	150	NM
434	444	100	NM
also see (12)			

(12) WELL LOG:
Ground Elevation

Material	From	To	SWL
SEE ATTACHED FORMATION LOG			
additional water bearing zones (11):	Est. Locations		
	490	505	see (10)
	540	562	see (10)
	626	641	see (10)
Estimated Flow Rate: see (8)	667	675	see (10)
	735	758	see (10)
	855	864	see (10)
	924	940	see (10)
NM	1056	1057+	NM
Bottom of well was abandoned by pumping			
32 sacks cement grout from bottom up to			
1005'.			

RECEIVED
SEP 06 2002
WATER RESOURCES DEPT.
SALEM, OREGON

Date started **5/15/02** Completed **8/19/02**

(unbonded) Water Well Constructor Certification:
I certify that the work I performed on the construction, alteration, or abandonment of this well is in compliance with Oregon water supply well construction standards. Materials used and information reported above are true to the best of my knowledge and belief.
Signed WWC Number **1367**
Date **9/5/02**

(bonded) Water Well Constructor Certification:
I accept responsibility for the construction, alteration, or abandonment work performed on this well during the construction dates reported above. All work performed during this time is in compliance with Oregon water supply well construction standards. This report is true to the best of my knowledge and belief.
Signed WWC Number **649**
Date **9/5/02**

ORIGINAL & FIRST COPY-WATER RESOURCES DEPARTMENT SECOND COPY-CONSTRUCTOR THIRD COPY-CUSTOMER

City of Tualatin - Well Log

by Schneider Drilling Co.

Start Card # 143357 Label #L57935

FM	TO	DESCRIPTION
0	1	Topsoil
1	10	Clay, brown, medium-soft
10	20	Clay, brown, medium w/claystone, brown
20	33	Claystone, brown, medium-hard, fractured
33	38	Basalt, black, medium, fractured
38	49	Basalt, brown & grey, medium, fractured w/clay
49	59	Basalt, grey, medium w/claystone
59	71	Basalt, black, medium, fractured, w/vesicules
71	101	Basalt, grey, hard, w/fractures
101	144	Basalt, dark grey, hard, w/fractures & vesicules
144	149	Basalt, red, soft, broken
149	153	Basalt, black & red, medium-soft, fractured, vesicular
153	160	Basalt, black, medium-soft, fractured, vesicular
160	170	Basalt, black & brown, medium, fractured, w/vesicules
170	186	Basalt, dark grey, medium-hard, fractured, w/vesicules
186	190	Basalt, dark grey, medium, fractured, vesicular w/claystone
190	204	Basalt, dark grey, medium-hard, fractured
204	219	Basalt, black & red, medium-soft, fractured, vesicular
219	245	Basalt, grey, hard, w/fractures
245	258	Basalt, dark grey, brown, medium-soft, fractured w/claystone
258	263	Basalt, dark grey, hard, fractures
263	273	Basalt, black & red, medium, fractured, vesicular
273	296	Basalt, grey, hard, some fractures
296	317	Basalt, brown, soft, broken, vesicular
317	331	Basalt, grey, hard, some fractures
331	356	Basalt, brown, soft, broken, vesicular
356	369	Basalt, dark grey, medium-hard, fractured
369	434	Basalt, dark grey, hard, some fractures
434	444	Basalt, black, soft, broken, w/ some claystone
444	454	Basalt, black, medium, fractured
454	490	Basalt, grey, hard, some fractures
490	505	Basalt, black, soft, vesicular, broken
505	530	Basalt, dark grey, medium-hard, some fractures & claytone

530	549	Basalt, grey, hard
549	562	Basalt, black & red, medium-soft, broken, vesicular
562	608	Basalt, grey, medium-hard, fractured
608	626	Basalt, dark grey, medium-hard, fractured
626	641	Basalt, dark grey, medium, fractured
641	662	Basalt, dark grey, medium- hard, fractured
662	667	Basalt, dark grey, medium, fractured
667	675	Basalt, dark grey & red, soft, fractured, vesicular
675	690	Basalt, dark grey, medium-hard, fractured
690	735	Basalt, grey, hard, some fractures
735	755	Basalt, black, soft, broken
755	758	Basalt, black & red, soft, broken
758	855	Basalt, grey, hard, occasional fractures
855	834	Basalt, grey, hard, fractured, black
834	838	Basalt, grey, hard
838	843	Basalt, dark grey, hard, green fractures, black, fractured
843	855	Basalt, grey, hard, fractured
855	856	Basalt, grey, hard, highly fractured
856	864	Basalt, grey, hard, some black fractures & vesicules
864	876	Basalt, grey, hard, some fractures
876	881	Basalt, grey, hard
881	889	Basalt, grey, hard, w/white crystal fractures
889	910	Basalt, grey, hard
910	924	Basalt, grey, hard, some fractures
924	935	Basalt, black, soft, broken, vesicular
935	940	Basalt, black, soft, fractured, vesicular
940	965	Basalt, grey, medium, fractured, some vesicules
965	980	Basalt, grey-black, medium, fractured (green), some vesicules & pyrite
980	1032	Basalt, grey, medium, fractured, some vesicules & pyrite
1032	1041	Basalt, grey, medium, fractured
1041	1051	Basalt, grey, medium-hard, fractured, some vesicles
1051	1056	Basalt, grey, hard, some fractures
1056	1057	Basalt, black & blue & grey, soft, vesicular
1057	1058	Clay, grey & light green, firm, soft
1058	1062	Claystone, green & grey, firm, fractured with some basalt
1062	1064	Claystone, green & grey, firm with wood & some basalt
1064	1070	Claystone, green & grey, firm with cemented gravel & basalt

RECEIVED
SEP 0 6 2002
WATER RESOURCES DEPT.
SALEM, OREGON

WASH 73811

STATE OF OREGON
WATER SUPPLY WELL REPORT
(as required by ORS 537.765 & OAR 690-205-0210)

WELL I.D. LABEL# L 118549
START CARD # 208770
ORIGINAL LOG #

(1) LAND OWNER

Owner Well I.D.
First Name Last Name
Company Tri-County Gun Club
Address 13050 SW Tonquin Road
City Sherwood State OR Zip 97140

(2) TYPE OF WORK

[x] New Well [ ] Deepening [ ] Conversion [ ] Alteration (complete 2a & 10) [ ] Abandonment(complete 5a)

(2a) PRE-ALTERATION

	Dia	+	From	To	Gauge	Stl	Plstc	Wld	Thrd
Casing:									

	Material	From	To	Amt	sacks/lbs
Seal:					

(3) DRILL METHOD

[x] Rotary Air [ ] Rotary Mud [ ] Cable [ ] Auger [ ] Cable Mud
[ ] Reverse Rotary [ ] Other

(4) PROPOSED USE

[x] Domestic [ ] Irrigation [ ] Community
[x] Industrial/ Commericial [ ] Livestock [ ] Dewatering
[ ] Thermal [ ] Injection [ ] Other

(5) BORE HOLE CONSTRUCTION

Special Standard [ ] (Attach copy)
Depth of Completed Well 330 ft.

BORE HOLE

Dia	From	To
10	0	259
6	259	330

SEAL

Material	From	To	Amt	sacks/lbs
Bentonite	0	127	66	S
		Calculated	50	
Cement	127	259	35	S
		Calculated	31	

How was seal placed: Method [ ] A [ ] B [x] C [ ] D [ ] E
[x] Other bent pour & probe
Backfill placed from ft. to ft. Material
Filter pack from ft. to ft. Material Size
Explosives used: [ ] Yes Type Amount

(5a) ABANDONMENT USING UNHYDRATED BENTONITE

Proposed Amount Pounds Actual Amount Pounds

(6) CASING/LINER

Casing	Liner	Dia	+	From	To	Gauge	Stl	Plstc	Wld	Thrd
●	○	6	x	1.4	259	.25	●	○	x	
○	●	4		250	330	SDR21	○	●	x	
○	○						○	○		
○	○						○	○		
○	○						○	○		

Shoe [ ] Inside [ ] Outside [ ] Other Location of shoe(s)
Temp casing [ ] Yes Dia From To

(7) PERFORATIONS/SCREENS

Perforations Method circular saw
Screens Type Material

Perf/ Screen	Casing/ Screen Liner	Dia	From	To	Scrn/slot width	Slot length	# of slots	Tele/ pipe size
Perf	Liner		290	320	0.2	6	120	

(8) WELL TESTS: Minimum testing time is 1 hour

○ Pump ○ Bailer ◉ Air ○ Flowing Artesian

Yield gal/min	Drawdown	Drill stem/Pump depth	Duration (hr)
35		330	1

Temperature 55± °F Lab analysis [ ] Yes By
Water quality concerns? [ ] Yes (describe below) TDS amount 70 ppm

From	To	Description	Amount	Units

RECEIVED BY OWRD
JUL 16 2015
SALEM, OR

(9) LOCATION OF WELL (legal description)

County WASHINGTON Twp 2 S N/S Range 1 W E/W WM
Sec 33 SE 1/4 of the SE 1/4 Tax Lot 100
Tax Map Number 2S133 Lot
Lat ° ' " or DMS or DD
Long ° ' " or DMS or DD
◉ Street address of well ○ Nearest address
owner

(10) STATIC WATER LEVEL

	Date	SWL(psi)	+	SWL(ft)
Existing Well / Pre-Alteration				
Completed Well	07-08-2015			182

Flowing Artesian? [ ] Dry Hole? [ ]

WATER BEARING ZONES Depth water was first found 125±

SWL Date	From	To	Est Flow	SWL(psi)	+	SWL(ft)
07-02-2015	125±	170	15			88
07-08-2015	279	320	35			182

(11) WELL LOG

Ground Elevation

Material	From	To
Basalt, grey, medium, fractured, vesicular	0	5
Basalt, brown, soft, fractured, some ves & silt, brown	5	10
Basalt, grey & brown, medium-hard, fractured &	10	
some claystone, tan & green, soft		50
Basalt, grey & brn, med, frac & some CS, red, soft	50	60
Basalt, grey & brown, hard, fractured	60	85
Basalt, brown & grey, med, frac & some CS, med	85	95
Basalt, brown & grey, medium, fractured & some	95	
clay, green soft & claystone, green, medium		125
Basalt, grey, hard, some fractures	125	130
Basalt, brown, medium, fractured	130	140
Basalt, brown & red, medium, fractured, some vesicle	140	
& some clay, brown, soft		145
Basalt, grey, hard, fractured, some vesicles	145	160
Basalt, brown, medium, fractured, vesicular	160	170
Basalt, brown, medium, fractured, some vesicles	170	
with clay, tan, medium		190
Basalt, grey & brown, hard, fractured & some	190	
claystone, tan, medium		200

Date Started 06-30-2015 Completed 07-08-2015

(unbonded) Water Well Constructor Certification

I certify that the work I performed on the construction, deepening, alteration, or abandonment of this well is in compliance with Oregon water supply well construction standards. Materials used and information reported above are true to the best of my knowledge and belief.

License Number 1797 Date 07-13-2015
Signed

(bonded) Water Well Constructor Certification

I accept responsibility for the construction, deepening, alteration, or abandonment work performed on this well during the construction dates reported above. All work performed during this time is in compliance with Oregon water supply well construction standards. This report is true to the best of my knowledge and belief.

License Number 649 Date 07-13-2015
Signed
Contact Info (optional)

ORIGINAL - WATER RESOURCES DEPARTMENT
THIS REPORT MUST BE SUBMITTED TO THE WATER RESOURCES DEPARTMENT WITHIN 30 DAYS OF COMPLETION OF WORK Form Version: 0.95

WASH 73811

WATER SUPPLY WELL REPORT - continuation page

WELL I.D. LABEL# L 118549
START CARD # 208770
ORIGINAL LOG #

(2a) PRE-ALTERATION

Dia	+	From	To	Gauge	Stl	Plstc	Wld	Thrd

Material	From	To	Amt	sacks/lbs

Water Quality Concerns

From	To	Description	Amount	Units

(5) BORE HOLE CONSTRUCTION

BORE HOLE Dia	From	To

SEAL Material	From	To	Amt	sacks/lbs
		Calculated		
		Calculated		
		Calculated		
		Calculated		

FILTER PACK

From	To	Material	Size

(10) STATIC WATER LEVEL

SWL Date	From	To	Est Flow	SWL(psi)	+	SWL(ft)

(6) CASING/LINER

Casing Liner	Dia	+	From	To	Gauge	Stl	Plstc	Wld	Thrd

(11) WELL LOG

Material	From	To
Basalt, grey, hard, fractured	200	245
Basalt, grey, medium-hard w/claystone, red, hard, ves	245	246
Claystone, brown, medium-hard, some vesicles	246	250
Basalt, grey, medium-hard, fractured, some vesicles	250	251
Basalt, grey, medium-hard, fractured	251	259
Basalt, dark grey, hard, some fractures	259	279
Basalt, dark grey & some brown, fractured, some ves	279	299
Basalt, grey, hard, fractured	299	309
Basalt, dark grey, medium-hard, fractured, vesicular	309	
with claystone, green		317
Basalt, dark grey w/reddish brown, fractured, vesicles	317	320
Basalt, grey, hard, occasional fracture	320	330

(7) PERFORATIONS/SCREENS

Perf/ Screen	Casing/ Screen Liner	Dia	From	To	Scrn/slot width	Slot length	# of slots	Tele/ pipe size

RECEIVED BY OWRD

JUL 16 2015

SALEM, OR

(8) WELL TESTS: Minimum testing time is 1 hour

Yield gal/min	Drawdown	Drill stem/Pump depth	Duration (hr)

Comments/Remarks

STATE OF OREGON
WATER SUPPLY WELL REPORT
(as required by ORS 537.765 & OAR 690-205-0210)

WASH 79009

8/13/2020

WELL I.D. LABEL# L 118549
START CARD # 1048470
ORIGINAL LOG # WASHINGTON 73811

(1) LAND OWNER

Owner Well I.D. 01
First Name RUSTY Last Name JOBE
Company TRI-COUNTY GUN CLUB
Address 13050 SW TONQUIN RD, SUITE 200
City SHERWOOD State OR Zip 97140

(2) TYPE OF WORK

☐ New Well ☒ Deepening ☐ Conversion ☐ Alteration (complete 2a & 10) ☐ Abandonment(complete 5a)

(2a) PRE-ALTERATION

	Dia	+	From	To	Gauge	Stl	Plstc	Wld	Thrd
Casing:	6	☒	1.4	259	.250	◉	○	☒	☐

	Material	From	To	Amt	sacks/lbs
Seal:					

(3) DRILL METHOD

☒ Rotary Air ☐ Rotary Mud ☐ Cable ☐ Auger ☐ Cable Mud
☐ Reverse Rotary ☐ Other

(4) PROPOSED USE

☒ Domestic ☐ Irrigation ☐ Community
☐ Industrial/ Commericial ☐ Livestock ☐ Dewatering
☐ Thermal ☐ Injection ☐ Other

(5) BORE HOLE CONSTRUCTION

Special Standard ☐ (Attach copy)
Depth of Completed Well 420.00 ft.

BORE HOLE

Dia	From	To
6	0	330
10	330	421

SEAL

Material	From	To	Amt	sacks/lbs
		Calculated		
		Calculated		

How was seal placed: Method ☐ A ☐ B ☐ C ☐ D ☐ E
☒ Other SEAL UNCHANGED
Backfill placed from ft. to ft. Material
Filter pack from ft. to ft. Material Size
Explosives used: ☐ Yes Type Amount

(5a) ABANDONMENT USING UNHYDRATED BENTONITE

Proposed Amount Actual Amount

(6) CASING/LINER

Casing	Liner	Dia	+	From	To	Gauge	Stl	Plstc	Wld	Thrd
○	◉	4	☐	5	420	Sch40	○	◉	☐	☒
○	○		☐				○	○	☐	☐
○	○		☐				○	○	☐	☐
○	○		☐				○	○	☐	☐
○	○		☐				○	○	☐	☐

Shoe ☐ Inside ☐ Outside ☐ Other Location of shoe(s)
Temp casing ☐ Yes Dia From + ☐ To

(7) PERFORATIONS/SCREENS

Perforations Method Saw
Screens Type Material

Perf/ Screen	Casing/ Screen Liner	Dia	From	To	Scrn/slot width	Slot length	# of slots	Tele/ pipe size
Perf	Liner	4	384	419	.13	3	120	

(8) WELL TESTS: Minimum testing time is 1 hour

○ Pump ○ Bailer ◉ Air ○ Flowing Artesian

Yield gal/min	Drawdown	Drill stem/Pump depth	Duration (hr)
54		418	0.7
50		400	0.3
35		340	

Temperature 57 °F Lab analysis ☒ Yes By SDI, Iron 0.8 ppm
Water quality concerns? ☐ Yes (describe below) TDS amount 190 ppm

From	To	Description	Amount	Units

(9) LOCATION OF WELL (legal description)

County WASHINGTON Twp 2.00 S N/S Range 1.00 W E/W WM
Sec 33 NE 1/4 of the SE 1/4 Tax Lot 100
Tax Map Number 2S133 Lot
Lat ° ' " or 45.35002000 DMS or DD
Long ° ' " or -122.80949000 DMS or DD
◉ Street address of well ○ Nearest address
13050 SW TONQUIN RD, SHERWOOD, OR 97140

(10) STATIC WATER LEVEL

	Date	SWL(psi)	+	SWL(ft)
Existing Well / Pre-Alteration	8/10/2020		☐	260
Completed Well	8/12/2020		☐	260

Flowing Artesian? ☐ Dry Hole? ☐

WATER BEARING ZONES Depth water was first found 330.00

SWL Date	From	To	Est Flow	SWL(psi)	+	SWL(ft)
8/10/2020	0	330	10		☐	260
8/12/2020	330	421	44		☐	260
					☐	
					☐	
					☐	

(11) WELL LOG

Ground Elevation 225.00

Material	From	To
Pre-Deepening	0	330
Basalt, gray fractured w/porous	330	345
Basalt, dark gray fractured	345	359
Basalt, gray fractured	359	369
Basalt, dark gray fractured	369	385
Basalt, gray fractured	385	399
Basalt, dark gray porous & fractured	399	402
Basalt, multicolored porous & fractured	402	404
Basalt, dark gray & blue porous & fract	404	406
Basalt, gray & brown	406	413
Basalt gray porous & broken	413	414
Basalt, gray & brown porous & fractured	414	419
Basalt, gray & black loose	419	420
Basalt, gray & black loose-Filled in 1'	420	421

Date Started 8/10/2020 Completed 8/12/2020

(unbonded) Water Well Constructor Certification

I certify that the work I performed on the construction, deepening, alteration, or abandonment of this well is in compliance with Oregon water supply well construction standards. Materials used and information reported above are true to the best of my knowledge and belief.

License Number 1715 Date 8/13/2020
Signed RUSSELL KENNER (E-filed)

(bonded) Water Well Constructor Certification

I accept responsibility for the construction, deepening, alteration, or abandonment work performed on this well during the construction dates reported above. All work performed during this time is in compliance with Oregon water supply well construction standards. This report is true to the best of my knowledge and belief.

License Number 2006 Date 8/13/2020
Signed CHRISTEN BLAND (E-filed)
Contact Info (optional) SKYLES WELL DRILLING 503-656-2683

ORIGINAL - WATER RESOURCES DEPARTMENT

THIS REPORT MUST BE SUBMITTED TO THE WATER RESOURCES DEPARTMENT WITHIN 30 DAYS OF COMPLETION OF WORK Form Version:

WATER SUPPLY WELL REPORT - Map with location identified must be attached and shall include an approximate scale and north arrow

WASH 79009

8/13/2020

Map of Hole

STATE OF OREGON
WELL LOCATION MAP

This map is supplemental to the WATER SUPPLY WELL REPORT

Oregon Water Resources Department
725 Summer St NE, Salem OR 97301
(503)986-0900

LOCATION OF WELL
Latitude: 45.35002000 Datum: WGS84
Longitude: -122.80949000
Township/Range/Section/Quarter-Quarter Section:
WM2.00S1.00W33NESE
Address of Well:
13050 SW TONQUIN RD, SHERWOOD, OR 97140

Well Label: 118549

Printed: August 13, 2020

DISCLAIMER: This map is intended to represent the approximate location the well. It is not intended to be construed as survey accurate in any manner.

Provided by well constructor

Attachment B

Application for Renewal of Aquifer Storage and Recovery (ASR) Limited License

ASR Limited License No. 10

OREGON WATER RESOURCES DEPARTMENT

APPLICATION FOR RENEWAL OF AQUIFER STORAGE AND RECOVERY (ASR) LIMITED LICENSE

Applicant: Terrance Leahy, City of Tualatin
Mailing Address: 18880 SW Martinazzi Ave, Tualatin, OR 97062
Phone and Email: tleahy@tualatin.gov; 503.691.3095

Authorized Agent: Renee Fowler, GSI Water Solution, Inc.
Mailing Address: 650 NE Holladay Street, Suite 900, Portland, OR 97232
Phone and email: rfowler@gsiws.com; 971.200.8511

Per OAR 690-350-020(5)(c), an ASR LL may be renewed upon request from the licensee if the applicant demonstrates to the Department's satisfaction that further testing is necessary and that the licensee complied with the terms of the current ASR LL. The applicant may also request modifications to an ASR LL at the time of renewal. Please consult the current ASR LL and provide as attachments the following:

- **Explanation of why further testing is necessary**
- **Summary of compliance with ASR LL**
- **Request for changes, as needed**
- **ASR LL Renewal Fee. Consult current fee schedule at: http://www.oregon.gov/owrd/pages/pubs/forms.aspx#fees**
- **Submit one hard copy in person or by mail to: Oregon Water Resources Department, 725 Summer St NE, Suite A, Salem, OR 97301**
- **Submit a digital copy to: Jennifer.L.Woody@oregon.gov**
- **Questions? Contact Jen Woody, OWRD Hydrogeologist, at 503-986-0855**

Signature of Applicant Terrance Leahy **Date** 9/28/2023

Title Water Division Manager