Public Infrastructure Committee Meeting Minutes

August 14, 2023

Mayor Drotzmann called the meeting to order at 5:00pm. Councilor Hardin was present. Councilor Peterson was excused. City staff in attendance included: City Manager Smith, Assistant City Manager Mark Morgan, City Attorney Rich Tovey, Street Superintendent Ron Sivey, Wastewater Superintendent Bill Schmittle, Water Superintendent Roy Bicknell, and Planning Assistant Heather La Beau. Also present was Anderson Perry engineer Jay Marlow.

Assistant City Manager Morgan updated attendees on the following:

Industrial Utility development Phase 1 Water Supply Construction Update-
The contractor has installed the water main for this phase. A connection under the feed canal still needs completed. The contractor is awaiting cultural studies and for the water level to drop in the canal. Water is expected to be delivered to the customer by the end of September.

Industrial Utility development Phase 2 Water Supply Design/Construction Update-
The second additional line will run in Feedville Rd from the Water Treatment Plant to Kelli Blvd. Expected delivery date of this water is February of 2025. This will be the permanent water supply. A separate procurement for the pumps and motors is already out for advertisement.

Industrial Utility development Phase 2a Water/Sewer/Street Extension Design/Construction Update-
SE 9th Street from E Penney Ave to Feedville was dedicated as part of a partition of the property. Utilities, including water and sanitary sewer, to serve the property will be placed in the right of way. The City has been working with the property owners to design and build the utilities. The property owner is paying for the entirety of the project, which includes paving half plus ten feet of the street, and a sewer lift station. The lift station will allow future service to limited properties south of Feedville. The city has requested an extension of E Penney Ave to the west.

Industrial Utility Development Industrial Wastewater (IWW) Design/Permitting/Construction Update-
On-site water treatment facilities will be used for the raw river water used at the facility. The sanitary sewer being taken to the city's treatment plant will include backwash water in a limited amount. Backwash water is the water used to clean the site's treatment filters.

The non-contact cooling water will be discharged to evaporation ponds on the properties. From the ponds, water will be discharged to lift stations, ultimately ending up in the Hermiston Irrigation District's A-Line canal for distribution. There is the ability to, in an emergency, potentially send overflow to the river. Applications have been submitted to DEQ.

Industrial Utility Development Aquifer Storage & Recovery Feasibility Analysis Update-
GSI performed an analysis of the existing wells and water sources to review aquifer storage and recovery alternatives. Options are detailed on page 12 of the attached report. One option was using Well #6 for water storage being supplied by either Well #5 or treated regional water. City staff is reviewing the costs and benefits of storing water.

Industrial Utility Development Aquifer Storage & Recovery Draft Business Model-
A draft plan for fees and usage guarantees is being developed to provide a redundant solution for the user. This is a conceptual plan as there are various options for aquifer storage being explored.

Industrial Utility Development Temporary Water Supply Agreement-
The attached agreement will be brought to the council at the second August meeting. The agreement includes both temporary and permanent figures.

Industrial Utility Development Pre-Treatment Program-
Code changes are being developed for creating an industrial pre-treatment requirement. The process will require permitting existing industrial users once the system is established. The program includes other uses, such as dentists and car washes.

Industrial Utility Development IWW Permitting & Rate Setting-
There is not a current rate set for accepting the non-contact cooling water. A separate rate and agreement will be developed. The full cost of maintenance, construction, and usage will be covered by the users.

Adjourn
Mayor Drotzmann adjourned the meeting at 5:48pm.

	Capital	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7	Yr 8	Yr 9	Yr10
Expenses											
Stahl Well Acquisition	$ (1,000,000)										
Stahl Well Rehab/Repair	$ (1,700,000)										
Recovery Wells???	$ (2,000,000)										
Debt Service		($579,467)	($579,467)	($579,467)	($579,467)	($579,467)	($579,467)	($579,467)	($579,467)	($579,467)	($579,467)
Purchased Water		$ (415,000)	$ (435,750)	$ (457,538)	$ (480,414)	$ (504,435)	$ (529,657)	$ (556,140)	$ (583,947)	$ (613,144)	$ (643,801)
Expense	**$ (4,700,000)**	**($994,467)**	**$ (1,015,217)**	**$ (1,037,005)**	**$ (1,059,882)**	**$ (1,083,903)**	**$ (1,109,124)**	**$ (1,135,607)**	**$ (1,163,414)**	**$ (1,192,611)**	**$ (1,223,269)**
Revenue											
City Water Sales											
Redundant Demand Charge		$ 1,000,000	$ 1,050,000	$ 1,102,500	$ 1,157,625	$ 1,215,506	$ 1,276,282	$ 1,340,096	$ 1,407,100	$ 1,477,455	$ 1,551,328
Revenue		**$ 1,000,000**	**$ 1,050,000**	**$ 1,102,500**	**$ 1,157,625**	**$ 1,215,506**	**$ 1,276,282**	**$ 1,340,096**	**$ 1,407,100**	**$ 1,477,455**	**$ 1,551,328**
Net Income		$ 5,532.56	$ 34,782.56	$ 65,495.06	$ 97,743.19	$ 131,603.72	$ 167,157.28	$ 204,488.51	$ 243,686.31	$ 284,844.00	$ 328,059.57

	RWS Rate/1k	Gallons	Annual $
Peak	0.00314	-745364160	$ (2,340,443)
RWS Potable Gal. Purchased	0.00314	132,165,605	$ (415,000)

Stored		132,000,000	292,000,000	452,000,000	612,000,000	772,000,000	932,000,000	1,092,000,000	1,252,000,000	1,412,000,000	**1,572,000,000**
City "Bank"			(162,000,000)	(132,000,000)	(132,000,000)	(132,000,000)	(132,000,000)	(132,000,000)	(132,000,000)	(252,000,000)	**(412,000,000)**
AWS "Bank"			(130,000,000)	(260,000,000)	(390,000,000)	(520,000,000)	(580,000,000)	(580,000,000)	(580,000,000)	(580,000,000)	**(580,000,000)**
AWS Guarantee			-	(60,000,000)	(90,000,000)	(120,000,000)	(220,000,000)	(380,000,000)	(540,000,000)	(580,000,000)	**(580,000,000)**
Total Balance			-	-	-	-	-	-	-	-	-

GSI Water Solutions, Inc.

TECHNICAL MEMORANDUM

Analysis of ASR Alternatives for the City of Hermiston, Oregon

To: Mark Morgan / City of Hermiston

From: Matt Kohlbecker, RG / GSI Water Solutions, Inc.
Owen McMurtrey / GSI Water Solutions, Inc.
Walt Burt, RG / GSI Water Solutions, Inc.

CC: Jay Marlow, PE / Anderson Perry & Associates

Date: June 22, 2023

1. Introduction

This technical memorandum (TM), prepared by GSI Water Solutions, Inc. (GSI), summarizes an analysis of Aquifer Storage and Recovery (ASR) alternatives for the City of Hermiston (City). The City is evaluating ASR to increase the supply and resiliency of its municipal potable water system.

1.1 City of Hermiston Water Supply Sources

The City of Hermiston provides potable drinking water to its citizens from three sources:

- Groundwater from a shallow alluvial aquifer (Well No. 5).
- Groundwater from a deep basalt aquifer (Well Nos. 2, 4 and 6)[1].
- The Regional Water System (RWS), which supplies potable water sourced from the Columbia River and treated at the Regional Water Facility and Treatment Plant (RWTP).

The City's water supply sources are summarized in Table 1 and shown in Figure 1.

Table 1. City of Hermiston Potable Water Supply.

Source Name	OWRD Well ID	Well Depth	Production Rate	Source Geology
Groundwater Sources				
Well No. 2	UMAT 5735	1,206 feet	1,000 gpm [1]	Columbia River Basalt Group
Well No. 3 (Backup)	UMAT 2075	955 feet	--	Columbia River Basalt Group
Well No. 4	UMAT 2061	1,041 feet	2,000 gpm [1]	Columbia River Basalt Group
Well No. 5	UMAT 1771	103 feet	4,000 gpm [1]	Alluvium (Catastrophic Flood Deposits)
Well No. 6	UMAT 5450	1,500 feet	1,781 gpm [1]	Columbia River Basalt Group
Surface Water Sources				
RWS–Potable from RWTP	NA	NA	1,527 gpm [2]	NA

Notes
(1) From Table 3-1 of Anderson Perry (2019) (2) See discussion in Attachment A and Anderson Perry (2019)

[1] Well No. 3 also accesses the deep basalt aquifer, but is intended to be used only for emergency fire flow supply (Anderson Perry, 2019).

In addition to the potable supply sources in Table 1, the City holds a surface water right for Minnehaha Springs [for 3,140 gallons per minute (gpm)] and has access to non-potable water from the RWS (for 3,000 gpm). Minnehaha Springs is not currently developed, and untreated RWS water is currently used for irrigation purposes only.

1.2 City of Hermiston Well Operations

Well No. 5 (the alluvial well) operates 21 to 23 hours per day during the summer months and is the City's primary water supply source, providing 65 percent to 75 percent of the City's annual water production since 2003 (Anderson Perry, 2019). As shown in Figure 2, water levels in Well No. 2 were stable between 1977 and 2006, indicating that the aquifer in which the well is completed was a sustainable water supply source during this time period. The City has indicated that water levels in Well No. 5 continue to be stable. It should be noted that the alluvial aquifer is actively recharged from multiple sources of water [canal leakage, precipitation, deep percolation of irrigation water, reservoir leakage, and stream leakage (Grondin et al., 1995)] and, therefore, likely continues to be a sustainable supply source.

As shown in Figure 3, the City's basalt wells are primarily used during the peak summer months (typically May through September) to supplement production from Well No. 5. Since the basalt wells were constructed in the late 1960s and early 1990s, groundwater levels have fallen anywhere from 30 feet to 100 feet (see Figure 2) indicating an overdraft condition. Groundwater levels are falling because regional pumping from the basalt aquifer (i.e., the Columbia River Basalt Group or CRBG) exceeds natural recharge. Overpumping of the CRBG aquifer is a region-wide concern because much of the recharge to the aquifer occurred thousands of years ago under wetter climactic conditions, while modern recharge rates are generally very low (Leonard and Collins, 1983; OWRD, 1994; NGS, 1997; Vaccaro et al, 2009; Grondin et al., 1995). In response to the declining groundwater levels, the Oregon Water Resources Department (OWRD) established the Stage Gulch Critical Groundwater Area (CGA) in May of 1991. The City's wells are located in Subarea A of the CGA, and the annual volume and maximum instantaneous rate that the City can use from the basalt wells are limited by annual critical groundwater area allocations and the maximum rate of the City's water rights. While the volume allocated to the City fluctuates to some extent based on the City's water use, it's generally not possible for the City to increase the maximum rate or volume available under its basalt aquifer groundwater rights without obtaining another existing groundwater right within the same critical groundwater subarea.

1.3 System Vulnerabilities Identified in the 2019 Water System Master Plan

The City's 2019 Water System Master Plan (WSMP) identified water supply vulnerabilities, including over-reliance on Well No. 5, declining water levels in the City's basalt wells, insufficient capacity to meet peak water demands in 2038, and higher costs for water purchased from the RWS (Anderson Perry, 2019). In addition, shallow alluvial groundwater from Well No. 5 is characterized by elevated nitrate concentrations that have the potential to increase over time. In order to overcome these vulnerabilities, the WSMP identified options to increase water system capacity and resiliency, including conservation, development of additional basalt well capacity (by obtaining an existing groundwater right), development of additional alluvial well capacity, development of additional capacity from the RWS, development of Minnehaha Springs, and ASR. ASR is potentially an important strategy to overcome the water supply vulnerabilities because it would not be subject to the supply limitations related to the Stage Gulch CGA discussed in Section 1.2.

1.4 Purpose and Objectives

The first step in evaluating the feasibility of an ASR program is to identify the ASR concepts that are viable from the perspectives of source water availability, water quality, hydrogeologic feasibility, existing well condition (e.g., well age, well construction, etc.), the volume of water that can be stored, and costs. The purpose of this TM is to identify the viable ASR alternatives for the City of Hermiston, and to rank the alternatives based on their respective pros and cons. The objectives of the evaluation are:

- Provide an overview of ASR and the regulatory framework for ASR in Oregon (discussed in Section 2).
- Provide an overview of the geologic and hydrogeologic setting in the City to identify source aquifers, identify receiving aquifers, and provide a basis for developing costs for construction of a new well (discussed in Section 3).
- Evaluate the options for ASR source water from the perspectives of water availability (both timing of availability and quantity available) and water quality, and evaluate options for ASR wells based on water quality, hydrogeology, well construction, well age, and the volume of water that can be recharged at the well (discussed in Section 4).
- Identify the ASR alternatives, develop planning-level costs for the alternatives, identify pros and cons of the alternatives, and rank the alternatives (discussed in Section 5).

Based on the identified ASR alternatives, next steps are recommended (discussed in Section 6).

2. Aquifer Storage and Recovery

ASR has been successfully implemented at several locations in eastern Oregon and Washington to meet needs similar to those of the City, including the City of Pendleton (since 2003), City of Baker City (since 2004), Madison Farms (since 2004), McCarty Ranches (since 2003), and the City of Kennewick (since 2012). An ASR program in the City would involve recharging the basalt aquifer with surplus supply available during periods of low demand (i.e., typically from October through April, as shown in Figure 3) and recovering the water during periods of high demand (i.e., typically from May through September, as shown in Figure 3). ASR would be a component of a strategy to improve the City's water system capacity and resiliency by: (1) providing additional supply capacity to meet increasing summer demands, (2) mitigating declining groundwater levels in the City's basalt wells to improve the long-term sustainability of the supply, and (3) improving groundwater quality issues (e.g., recharging Well No. 6 with high-quality, cooler, oxygenated water could be used to condition the aquifer to reduce the temperature and oxidize hydrogen sulfide in native groundwater associated with the well).

2.1 ASR Permitting

OWRD is the lead agency that permits and oversees ASR projects in the State of Oregon. OWRD consults with the Oregon Department of Environmental Quality (DEQ) and the Oregon Health Authority (OHA) Drinking Water Program when permitting an ASR project. Prior to initiating an ASR project, the City applies for a limited license for ASR pilot testing from OWRD. The objective of ASR pilot testing is to allow incremental development of the ASR system over time up to the limits allowed by the ASR limited license. An ASR limited license is issued for a 5-year period and can be renewed for additional 5-year periods if prolonged testing is needed to fully develop the project. After completion of an ASR testing program under a limited license, an applicant may apply for a permanent ASR permit.

2.2 City ASR Alternatives Analysis

This ASR Alternatives Analysis considers source water from existing municipal drinking water sources (Well No. 5 and potable water from the RWTP) and recharge of the basalt aquifer using existing basalt wells (Well No. 2, Well No. 4, and/or Well No. 6) or a new basalt well.

It should be noted that using RWTP water as a source for ASR is not a preferred development option for the source. Specifically, it would be more cost effective to first use the RWTP source to its full potential to stay within OWRD's limits on basalt well pumping. If the RWTP is to be used as source water for ASR (probably because use of Well No. 5 is fatally flawed), the benefits would be non-economic: (1) mitigate falling water levels in the CRBG, (2) improve water quality, and (3) increase resiliency.

The basalt aquifer (i.e., the CRBG) is commonly an ideal receiving aquifer for ASR because the deeper water-bearing zones are confined (meaning that they are not in hydraulic communication with the surface) and because there is minimal use of the City's basalt wells during the winter recharge period. ASR would increase the volume of groundwater that is available to Hermiston (95% of injected water can be recovered initially, and up to 98% of injected water can be recovered if the City can demonstrate that water is not escaping the groundwater reservoir). The majority of operational ASR systems utilize basalt aquifers such as those beneath the City.

This ASR alternatives analysis does not consider the use of Minnehaha Springs for source water due to uncertainty about the availability of water under the City's water rights for Minnehaha Springs, potential water quality concerns, and because significant capital investment would be required to develop Minnehaha Springs as a potable water source (see Attachment A for an in-depth discussion)[2]. This ASR alternatives analysis also does not consider the use of untreated water from the RWS as a separate option because it would need to be treated at the RWTP, at which point it would be essentially the same as using water from the RWS as source water[3].

3. Geologic and Hydrogeologic Setting

It is necessary to understand the geologic and hydrogeologic setting when evaluating ASR alternatives to identify source and receiving aquifers, estimate potential storage volumes and injection and recovery rates, develop planning-level costs, and identify fatal flaws for ASR. The Study Area for this ASR Alternatives Assessment is the City of Hermiston, as shown in Figure 1. The following sections provide an overview of the geology (Section 3.1) and hydrogeology (Section 3.2) in the vicinity of Hermiston, with a focus on implications for ASR.

3.1 Geology

The City is located in the Umatilla Basin, a topographic and structural trough between the Blue Mountains of Oregon and the Columbia Hills of Washington. Surficial geology and geologic structures in the Hermiston area are shown in Figure 4, and subsurface geology is shown in the cross sections in Figure 5 and Figure 6. The following sections discuss the geologic units (Section 3.1.1) and the geologic structures (Section 3.1.2) in the Study Area.

3.1.1 Geologic Units

Geology in the Hermiston area consists of alluvial deposits that overlie and, in some places, abut against the basalts of the CRBG (Grondin et al., 1995).

- The **alluvial deposits** in Hermiston are primarily comprised of Catastrophic Flood Deposits and the Alkali Canyon Formation (Grondin et al., 1995; Tolan, 1992).
    - The Catastrophic Flood Deposits were deposited by mega-floods caused by the episodic failure of the ice dam that impounded Glacial Lake Missoula, with the last episode occurring about 13,000 years ago (Baker, 1978). The deposits are comprised of "coarse-grained deposits" (boulders, gravels, and medium- to coarse-sands) and "fine-grained deposits" (silts, clays, and fine-grained sands).

[2] Note that Minnehaha Springs is considered to be a surface water source because the City holds a surface water right on the spring (i.e., water quality testing could not be used to demonstrate it is a groundwater source).
[3] This TM also does not consider recharging the City's wells under the Artificial Recharge (AR) rules. While there are specific circumstances that well recharge under the AR rules is necessary, the AR rules are less desirable because (1) only 85% of the injected water can be recovered (as opposed to at least 95% under the ASR rules) and (2) the AR rules require that concentrations of constituents in source water are below background concentrations in the receiving aquifer, which is a stricter standard than the ASR rules.

- The older Alkali Canyon Formation, which underlies the Catastrophic Flood Deposits, was deposited by streams that drained the Blue Mountains to the south, and is comprised of tuffaceous (ash-rich) silts and sands, and moderately-indurated gravels. The sediments of the Alkali Canyon Formation are commonly lower permeability because much of the primary porosity of the sediments has been filled by mineral cementation.

The alluvial deposits in Hermiston are up to 150 feet thick in the Hermiston Trough and as thin as about 10 feet thick outside of the trough (see Section 3.1.2 for a discussion of the Hermiston Trough)[4]. Well No. 2, which was logged by Tolan (1992), identifies about 15 feet of Catastrophic Flood Deposits and 20 feet of the Alkali Canyon Formation.

- The Columbia River Basalt Group (**CRBG**) consists of a series of continental flood basalt sheet flows that erupted between 6 and 17 million years ago from linear fissure systems located south and east of the Umatilla Basin (Tolan et al., 1989; Tolan et al., 2009). The total thickness of the CRBG in the Umatilla Basin is probably at least 5,000 feet and may exceed 10,000 feet (Davies-Smith et al., 1988). The CRBG in the Hermiston area is made up of three formations: Saddle Mountains Basalt, Wanapum Basalt, and Grande Ronde Basalt. The formations are divided into multiple members and each member consists of one or more individual lava flows, usually with distinct physical characteristics. In the Study Area, the upper 1,300 feet of the CRBG is tapped by City wells and is comprised of at least five basalt members: the Pomona Member and Umatilla Member (Saddle Mountains Basalt), Priest Rapids Member and Frenchman Springs Member (Wanapum Basalt), and the Sentinel Bluffs Member (Grande Ronde Basalt) (Tolan, 1992; Grondin et al., 1995). The basalt units are shown in the cross sections (Figure 5 and Figure 6); the basalt flows in Well No. 2 were identified based on geologic logging of well cuttings and chemical analysis, and the flows in other City wells are inferred based on well driller log interpretations and correlations with Well No. 2.

3.1.2 Geologic Structure

There are two geologic structures in the vicinity of the Study Area—the Hermiston Trough and the Service Anticline.

- The **Hermiston Trough** is a northeast-trending depression in the CRBG surface that was formed by structural deformation (i.e., a syncline) and erosion by the Catastrophic Floods. The trough is filled by alluvial deposits that are in hydraulic communication with shallow members of the CRBG where the water-bearing CRBG interflow zones are exposed to saturated alluvium.

- The **Service Anticline** is a north-south trending fold and fault complex approximately aligned with Umatilla and Hermiston Buttes (see Figure 4). In places, a combination of folding and erosion results in the CRBG aquifers daylighting against the saturated alluvial deposits, causing the CRBG to be in hydraulic communication with the alluvial deposits.

As shown in Figure 5 and Figure 6, the Pomona Member appears to be in hydraulic communication with the alluvial deposits near these geologic structures and elsewhere in the Study Area.

3.2 Hydrogeology

The coarse-grained Catastrophic Flood Deposits (Section 3.2.1) and CRBG (Section 3.2.2) are the principal aquifers in the study area. The sediments of the Alkali Canyon Formation are commonly cemented and have hydraulic conductivities several orders of magnitude lower than the other aquifers.

[4] See UMAT 1715 (156 feet thick) and UMAT 54169 (12 feet thick)

3.2.1 Coarse-Grained Catastrophic Flood Deposits

The coarse-grained Catastrophic Flood Deposits are an aquifer characterized by high permeabilities[5] and well yields (Grondin et al., 1995). City Well No. 5 is completed in this unit and has an estimated capacity of 4,000 gpm (Anderson Perry, 2019). The coarse-grained Catastrophic Flood Deposits are unconfined to semi-confined, meaning that there is hydraulic communication between the aquifer and the surface. Evidence for the unconfined to semi-confined nature of the aquifer includes the absence of continuous regional-scale, low permeability clay layers that overlie the aquifer and the presence of high concentrations of nitrate in wells completed in the aquifer (Grondin et al., 1995).

Because the coarse-grained Catastrophic Flood Deposits are unconfined and in connection with surface water bodies, they are not a candidate for recharge by ASR because recharged water is likely to be lost by discharge to surface water bodies. The high yield of the aquifer makes it a candidate to supply ASR source water, although it should be noted that it is more susceptible to contamination from surface sources such as fertilizers from agricultural activities.

3.2.2 Columbia River Basalt Group Aquifer

CRBG basalt flows typically exhibit a three-part intraflow structure: flow top, flow interior, and flow bottom. The flow top and flow bottom are commonly vesicular and brecciated, and together may form relatively permeable intervals that comprise the primary water-bearing zones in the CRBG (termed "interflow zone" in this TM per Newcomb, [1959]). Certain units of the CRBG are a target storage aquifer for ASR *where the interflow zones are hydraulically isolated from alluvial deposits* so recharged water cannot escape from the receiving aquifer. Based on geologic cross sections in Figure 5 and Figure 6 we conclude the following about potential CRBG target storage aquifers in the vicinity of the City:

- The Pomona Member of the CRBG appears to be hydraulically connected to the alluvial deposits near structural features such as the Hermiston Trough and Service Anticline and, therefore, is not a suitable target storage aquifer for ASR[6];

- The Umatilla, Priest Rapids, Frenchman Springs, and Sentinel Bluffs Members of the CRBG appear to be hydraulically isolated from the alluvial deposits and, therefore, are potential target storage aquifers for ASR. The City and other groundwater users in the region operate wells that draw from these units, providing some information regarding the characteristics of the aquifers.

4. Evaluation of Alternatives for ASR Source Water and ASR Wells

This section presents an evaluation of source water options (Section 4.1) and ASR well options (Section 4.2) to identify viable ASR alternatives.

4.1 Source Water Options

The City has identified an existing alluvial groundwater well (Well No. 5) and potable water from RWTP (treated Columbia River water) as potential sources of water for ASR storage. This section provides an evaluation of these source options from the perspectives of water availability (both timing and quantity) (Section 4.1.1) and source water quality (Section 4.1.2).

[5] According to Table 2.1 of Grondin et al. (1995), hydraulic conductivity of the coarse-grained Catastrophic Flood Deposits ranges from about 600 feet per day to 5,000 feet per day.
[6] See cross sections E to E' and F to F' on Plate 2.3c of Grondin et al. (1995). Note that the Study Area only includes the eastern limb of the Service Anticline.

4.1.1 Source Water Availability

This section provides an overview of a source water availability analysis. An in-depth evaluation of source water availability is provided in Attachment A.

Well No. 5 (Alluvial Groundwater)

Exhibit 4 in Attachment A shows the average monthly pumping rate at Well No. 5 based on water use from 2019 through 2021. The monthly average rate of Well No. 5 during the peak month of July is 3,500 gpm, equivalent to over 20 hours per day of pumping and at the effectively full well capacity of 4,000 gpm. During the winter months from November through March, pumping rates at Well No. 5 averaged over the month ranged from 750 gpm to 1,100 gpm. Assuming an instantaneous capacity of 4,000 gpm, an average of 2,900 gpm to 3,250 gpm is available for ASR during the winter months. Note that this is the maximum available rate and volume from Well No. 5, and the City may not necessarily want to pump at this rate continuously all winter to allow the well to rest. As discussed in Section 1.2, this pumping rate appears to be sustainable based on available data, and recharge mechanisms to the Catastrophic Flood Deposits.

Regional Water Treatment Plant

A 42-inch transmission pipeline conveys raw water to the RWTP located at the intersection of Hermiston Highway and Feedville Road (shown in Figure 1). The RWTP provides potable water with a developed capacity of 2,800 gpm. The City holds an allocation of 1,527 gpm of the developed capacity. Because the City relies on Well No. 5 during the winter months, the full 1,527 gpm of the City's allocated developed capacity is currently available for ASR during the winter months[7].

According to a 2018 memo developed by Stantec (Appendix K of the 2019 WSMP), the capacity of the City's distribution piping is currently insufficient to handle flows in excess of 1,500 gpm. GSI understands that piping capacity improvements are anticipated to occur within the next few years. As a result, it's possible to expand RWTP capacity to 2,800 gpm for ASR without adding additional filter units. Currently, Shearer's Foods holds an allocation of 255 gpm of capacity in the RWTP, and 1,018 gpm of developed capacity are held in reserve by Simplot. Neither Shearer's nor Simplot's share of developed capacity are currently in use.

Therefore, the RWTP can currently provide 1,500 gpm for ASR (under current conditions) with potential expansion to 2,800 gpm for ASR with distribution piping upgrades and lease or acquisition of the Shearer's Foods and Simplot allocations. There are no concerns regarding water availability under the water rights for the RWS and Columbia River flows are robust, especially during the winter months.

4.1.2 Source Water Quality

This section provides an overview of a source water quality analysis. An in-depth evaluation of source water quality is provided in Attachment B.

Oregon's ASR rules require that constituent concentrations in ASR source water be below 50% of certain regulatory standards[8]. If a constituent concentration exceeds an ASR standard, then Oregon's ASR rules require that the permittee employ technically feasible, practical, and cost-effective methods to minimize concentrations in injection source water. In order to evaluate whether the City's candidates for ASR source water (i.e., Well No. 5 and treated Columbia River water from the RWTP) would meet ASR standards, GSI downloaded water quality data that is available from the Oregon Health Authority (OHA) online drinking water quality database (OHA, 2022). Note that the data do not represent the complete list of constituents that are required to be analyzed in ASR source water, so the data review presented in this section represent an initial water quality evaluation that will need to be supplemented by additional analyses in the future.

[7] As noted in Section 1, the City also holds an allocation of 7,000 gpm of raw water at this location (of which 3,000 gpm has been developed).

[8] Constituents regulated under OAR 333-061-0030 and OAR 340-040.

Water Quality of Columbia River Water from the RWTP

As shown in Table B.1 of Attachment B, treated Columbia River water from the RWTP meets ASR standards. Therefore, no treatment upgrades are anticipated to be required to use the RWS water from the RWTP for ASR purposes based on available data.

Water Quality of Well No. 5

Based on available data, the quality of water from Well No. 5 meets the ASR standards for all constituents with the exception of nitrate and arsenic. Table 2 summarizes historical arsenic and nitrate detections in Well No. 5, and Figure B.1 and Figure B.2 of Attachment B provide a time-series of nitrate and arsenic data, respectively.

Table 2. Arsenic and Nitrate Concentrations in Well 5 in micrograms per liter (ug/L).

Constituent	No. Samples	Period of Record	ASR Regulatory Standard	Minimum	Mean	Maximum
Arsenic	15	1987 - 2020	5	3.0	8.5	20.0
Nitrate	45	1987 - 2022	500	ND	4,904	7,000

Arsenic appears to be present regionally in the coarse-grained Catastrophic Flood deposits; concentrations in alluvial wells northeast of and within the city limits of Hermiston range from 5 micrograms per liter (ug/L) to 24 ug/L (see Plate 4.6 of Grondin et al., 1995). The regional distribution of arsenic and correlation with the Catastrophic Flood Deposits suggests that the arsenic is most likely derived from felsic minerals in the Catastrophic Flood Deposits and, therefore, is naturally-occurring. While arsenic-based pesticides have been identified as another potential source, they are not commonly used in Oregon and are generally not mobile in the environment (Pers. Comm., 2022).

Arsenic concentrations in Well No. 5 appear to be stable. Concentrations detected in samples from the well have exceeded the ASR standard in almost every sample collected, but have been below the EPA Maximum Contaminant Level since 1993 (Figure B.2 of Attachment B). Elevated levels of arsenic are not necessarily a fatal flaw to using Well No. 5 for ASR source water, but it will be necessary to engage OWRD to understand the technically feasible, practical, and cost-effective measures to minimize the concentration of arsenic in source water and the associated costs.

The nitrate in Well No. 5 is derived from agricultural activities in the Umatilla Basin (Grondin et al., 1995). As shown in Figure B.1 of Attachment B, nitrate concentrations currently appear to be stable in Well No. 5, have never exceeded the EPA Maximum Contaminant Level, and exceed the ASR standard in most of the samples that have been collected. Elevated levels of nitrate are not a fatal flaw to using Well No. 5 for ASR source water, but it will be necessary to engage OWRD to understand the technically feasible, practical, and cost-effective measures to minimize the concentration of nitrate in source water. OWRD has previously permitted concentrations of nitrate in ASR source water exceeding the 500 ug/L ASR regulatory standard provided the operator can demonstrate that denitrification is occurring in the basalt aquifer based on nitrogen isotopes and water quality analyses.

4.2 ASR Well Options

The City is considering recharge at existing wells (Well No. 2, Well No. 4, and Well No. 6) and a new well completed in the CRBG aquifer. This section provides an evaluation of these source options from the perspectives of basalt water quality (Section 4.2.1), CRBG hydrogeology (Section 4.2.2), well construction (Section 4.2.3), well condition (Section 4.2.4), and storage volume (Section 4.2.5).

4.2.1 Basalt Groundwater Quality

As shown in Table B.2 of Attachment B, groundwater from Well No. 2, Well No. 4, and Well No. 6 meets Safe Drinking Water Act (SDWA) standards. It is reasonable to assume that groundwater quality a new well, which would be located about two miles west of Well No. 6 and be constructed similarly, would also meet SDWA standards. Therefore, all of the wells under consideration are candidates for ASR wells from the perspective of groundwater quality.

4.2.2 CRBG Hydrogeology

As discussed in Section 2.2.2, the CRBG aquifer is suitable for ASR in areas where it is hydraulically isolated from alluvial deposits because the injected water will be confined to the CRBG system. In the Study Area, the highest potential for loss of stored water occurs in the Pomona Member near structural features such as the Hermiston Trough and Service Anticline, and where the flow pinches out, as shown in the geologic cross sections (Figure 5 and Figure 6).

- Based on a geologic log (Tolan, 1992), Well No. 2 (UMAT 5735) is not completed in the Pomona Member of the CRBG[9] and, therefore, appears to be hydraulically isolated from alluvial deposits.

- Well No. 4 (UMAT 2061) is completed with an open borehole from 310 to 1,041 feet bgs. As shown in the geologic cross sections in Figure 5 and Figure 6, the open interval of Well No. 4 does not appear to be open to the Pomona Member of the CRBG.

- Well No. 6 (UMAT 5450) is completed with an open borehole from 650 to 1,500 feet bgs. As shown in the geologic cross section in Figure 5, Well No. 6 does not appear to be open to the Pomona Member of the CRBG.

While ASR pilot testing is required to confirm the hydraulic isolation of the CRBG at Well No. 2, Well No. 4 and Well No. 6, it appears that none of these wells are open to the Pomona Member of the CRBG and, therefore, are good candidates for ASR because they are more likely to be hydraulically isolated from alluvial deposits. We further note that the apparent hydraulic isolation is further supported by the fact that nitrate, which would be evidence of hydraulic communication with alluvial deposits, has rarely been detected in Well No. 2 [10], Well No. 4 [11], or Well No. 6 [12].

4.2.3 Well Construction

ASR wells must meet current OWRD well construction standards. Attachment C presents GSI's evaluation of whether the well seal, casing material, and liners meet current OWRD well construction standards. GSI's review of the construction of Well No. 2, Well No. 4, and Well No. 6 was based on information presented on the well driller logs (UMAT 5735, UMAT 2061, and UMAT 5450, respectively).

- Well No. 2 and Well No. 6 appear to meet current well construction standards in OAR 690-210, or OWRD has issued a special standard that approves the well construction.

- Information on the well report for Well No. 4 indicates that the well may not meet current OWRD well construction standards because: (1) the report does not clearly indicate that the well is sealed from

[9] See UMAT 5735 for well completion details, and the geologic log from Tolan (1992).
[10] Nitrate has only been detected in 1 of the 18 groundwater quality samples collected from Well No. 2 since 2002 (OHA, 2022).
[11] Nitrate has only been detected in 2 of the 24 groundwater quality samples collected from Well No. 4 since 2002 (OHA, 2022).
[12] Nitrate has only been detected in 1 of the 24 groundwater quality samples collected from Well No. 6 since 2002 (OHA, 2022).

ground surface to at least 18 feet below ground surface, and (2) there does not appear to be a seal between 80 and 296 feet bgs.

While the construction of Well No. 2 and Well No. 6 appear to be suitable for ASR, it will be important to determine whether OWRD would approve the use of Well No. 4 for ASR prior to further consideration of the well because it may not meet current well construction standards.

4.2.4 Well Condition Assessment

Table 3 summarizes the well casing materials at Well No. 2, Well No. 4, and Well No. 6. All wells are constructed with 0.375-inch wall thickness steel (likely low carbon steel). Over time, low carbon steel corrodes, resulting in the formation of holes in the well casing leading to structural instability. In Oregon, groundwaters tend not to be chemically aggressive, and low carbon steel is a relatively long-lasting well material. While the exact lifespan of low carbon steel well casing depends on the geochemical environment in the well and operational history of the well, our general observation from existing wells completed in the CRBG aquifer is that low carbon steel begins to approach the end of its useable life after about 50 to 75 years, with 0.250-inch wall thickness being on the earlier end of the timeframe and 0.375-inch wall thickness being on the later end of the timeframe.

Table 3. Well Materials at City Basalt Wells.

Well ID	Year Constructed	Casing Material	Wall Thickness
Well No. 2	1992 (30 years old)	Steel	0.375-inches
Well No. 4	1968 (54 years old)	Steel	0.375-inches
Well No. 6	1990 (32 years old)	Steel	0.375-inches

As shown in Table 3, well No. 2 and Well No. 6 are younger than Well No. 4. While Well No. 4 may still have several decades of service remaining, Well No. 2 and Well No. 6 may be better candidates for ASR retrofits. Each well should be brushed, pumped and evaluated with a video survey to assess its condition, and the wells prioritized for ASR in part on the basis of the condition assessment

4.2.5 Storage Volume

The volume of water that can be stored in an ASR well is a function of the time available for recharge, headroom available in the ASR well to accommodate water level buildup (assuming ASR is not conducted under pressure), and the specific capacity of the ASR well (the amount of water level rise per gallon per minute of water that is recharged). Specific capacity is a combined measure of the efficiency of a well and the productivity of the aquifer.

The following assumptions were used to calculate the estimated storage volume in Well No. 2, Well No. 4, Well No. 6, and a new well:

- Recharge occurs continuously from October 1 through March 31 (182 days or 6 months). Recharge for 6 months appears to be reasonable based on the winter time basalt well use summarized in Figure 3, and from the standpoint of source water availability.

- Recharge occurs with the water level below ground surface (i.e., the well is not pressurized during injection). Available headroom in each well is the depth to groundwater minus a 10 feet safety factor to account for loss of efficiency during operation and other uncertainties. The depth to groundwater was based on measurements taken in February of 2022, which is during the likely recharge season, and also the period of seasonal high groundwater levels in the CRBG aquifers in the region.

- Specific capacity is calculated from well testing at the time of well construction, with safety factors added to account for loss of efficiency from plugging during injection and normal well aging (see footnotes in Table 4).

- The recharge rate is calculated from the lesser of: (1) available headroom and specific capacity[13] *or* (2) 75% of the pumping rate at each well. This effectively limits recharge rate to 75% of the recovery rate, so that the wells are pumped at a higher rate than water is recharged. Pumping at a higher rate during recovery is a standard of practice in ASR operations removes suspended solids introduced during injection that could clog the well.

As shown in Table 4, Well No. 6 has the largest estimated potential storage volume (350 million gallons, or MG), followed by Well No. 4 (284 MG), a new well (197 MG), and Well No. 2 (167 MG).

Table 4. Estimated Storage Volumes in Well No. 2, Well No. 4, Well No. 6, and a New Well.

Parameter	Well No. 2 UMAT 5735	Well No. 4 UMAT 2061	Well No. 6 UMAT 5450	New Well
Pumping Rate [1]	1,000 gpm	2,000 gpm	1,781 gpm	1,000 gpm
Days of Recharge	182 days	182 days	182 days	182 days
Depth to Groundwater [2]	117 feet	132 feet	430 feet	430 feet
Available Headroom [3]	107 feet	122 feet	420 feet	420 feet
Specific Capacity	5.9 gpm/ft [4]	8.9 gpm/ft [5]	44.6 gpm/ft [6]	22.3 gpm/ft [7]
Recharge Rate	630 gpm [8]	1,090 gpm [8]	1,330 gpm [9]	750 gpm [9]
Storage Volume	**167 MG**	**284 MG**	**350 MG [10]**	**197 MG**

Notes

(1) Assume recovery rate is equal to the current pumping rate of the well [from Table 3-1 of Anderson Perry (2019)]. For the new well, which is located near Well No. 6, assume production is equal to Well No. 6 with a reduction of 1,000 gpm to account for sealing off of interflow zones from 160-225, 447-468, and 716-765 in the new well (all of which were noted on the log to produce a total of 500 gpm of the 1,000 gpm in UMAT 5450).

(2) Measured on February 16, 2022. Assume depth to water at the new well is the same as depth to water at Well No. 6.

(3) Assume recharge occurs with the water level below ground surface at all times (i.e., wellhead is not pressurized). The available headroom is the depth to groundwater less 10 feet for a safety interval.

(4) Calculated from a 24-hour constant rate pumping test in June 1992, after the well was constructed (Q=1,982 gpm, Δs=300 feet, SC=6.6 gpm/ft). Specific capacity was reduced by 10% as a factor of safety to account for longer-term well operation during ASR (because specific capacity decreases over time).

(5) Calculated from a 24-hour constant rate pumping test in July 1968, after the well was constructed (Q=2,500 gpm, Δs=253 feet, SC=9.9 gpm/ft). Specific capacity was reduced by 10% as a factor of safety to account for longer-term well operation during ASR (because specific capacity decreases over time).

(6) Calculated from a one-hour constant rate pumping test in September 1990, after the well was constructed (Q=2,500 gpm, Δs=42 feet, SC=59.5 gpm/ft). Specific capacity was reduced by 25% as a factor of safety to account for longer-term well operation during ASR (because specific capacity decreases over time).

(7) Assumed to be the same as Well No. 6, reduced by 50% to account for sealing off of interflow zones (see Footnote No. 1).

(8) Recharge rate based on available headroom and specific capacity.

(9) Recharge rate limited to 75% of pumping rate.

(10) Note that recharge rates are generally lower when cold source water is injected into a warmer reservoir because the hydraulic conductivity is lower due to the higher viscosity (Freeze and Cherry, 1979). We did not account for reduced injection rates (and, therefore, volumes) due to temperature differences at Well No. 6 because: (1) the storage volume is limited by the pumping rate as opposed to headroom and specific capacity, and (2) the well is highly productive (specific capacity of 44.6 gpm/ft) and has significant headroom (420 feet) to accommodate increased mounding related to temperature differences between source water and the receiving aquifer.

[13] Recharge rate in gpm = (available headroom in feet) * (specific capacity in gpm/ft)

Note that the recharge rates used to estimate these storage volumes are less than the cumulative available water from Well No. 5 (2,900 gpm to 3,250 gpm). Furthermore, the assumed injection rate is less than the readily available treated source water capacity from the RWTP. The storage volume for the new well should be considered highly approximate due to assumptions made about well productivity and well construction. For example, a new well would need to be constructed differently than other City wells due to OWRD prohibitions on comingling aquifers[14].

5. ASR Alternatives and ASR Implementation Costs

Table 5 summarizes ASR alternatives for the City of Hermiston.

Table 5. Pros and Cons for Source Water and ASR Well Options.

	Pros	Cons
Source Water Option (Not Ranked in Order of Preference)		
Well 5	▪ Water is available at rates of 2,900 gpm to 3,250 gpm (depending on the year that was used to estimate available rate; see Section 4.1.1)	▪ Arsenic and nitrate exceed ASR water quality standards; may require treatment
Treated Columbia River Water (RWS from the RWTP)	▪ Water is available at a rate of 1,527 gpm ▪ Water meets ASR water quality standards	▪ Relatively expensive water source [see Anderson Perry (2019) for discussion]. However, cost of water per gallon may decrease if the RWTP is run at higher production rates
ASR Well Option (Ranked in Order of Preference)		
(1) Well No. 6	▪ ASR would provide water quality benefits (temperature and H_2S) ▪ Mitigate declining water levels (long-term source sustainability) ▪ Meets current well construction standards ▪ Higher capacity well ▪ Relatively large estimated storage volume (350 MG) ▪ Important well (located in an area of high growth and primary source of supply for pressure zone 3)	▪ Well 6 is used infrequently during the winter to meet demands in pressure zone 3. Therefore, the City would need to determine if these demands could be met using the RWS or pumping from a lower pressure zone.
(2) New Well at the RWTP	▪ ASR could be used to authorize water use from the new well ▪ Mitigate against potential future water level declines (long-term source sustainability) ▪ Would meet current well construction standards ▪ Important well (located in an area of high growth; able to serve adjacent pressure zone 3 and areas of new development in pressure zone 5)	▪ More expensive ▪ Storage volume (estimated at 197 MG) is uncertain because OWRD restrictions on the number of water-bearing zones the well can draw water from may limit the yield of the well
(3) Well No. 2	▪ Meets current well construction standards ▪ Mitigate declining water levels (long-term source sustainability) ▪ Some ASR infrastructure already installed [see Anderson Perry (2019) for details]	▪ Smaller estimated storage volume (167 MG)
(4) Well No. 4	▪ Relatively large estimated storage volume (284 MG) ▪ Mitigate declining water levels (long-term source sustainability)	▪ Potentially substandard well construction (discussion with OWRD required) ▪ Well is relatively old (54 years old)

[14] OWRD has, in the past, restricted the open interval of wells completed in the CRBG to 100 feet, which limits the number of interflow zones that a well can access. However, OWRD may consider longer open intervals based on water level measurements.

The City has multiple potentially viable options for ASR source water (treated surface water from the RWS RWTP and groundwater from Well No. 5) and ASR wells (existing well nos. 2, 4, and 6, or a new well). Combining these options yields 8 potential ASR development alternatives. As shown in Table 5, each alternative is characterized by unique pros and cons. Options for ASR wells are ranked in order of preference. Options for source water are not ranked due to uncertainty associated with the technically feasible, practical, and cost-effective measures that will be required to minimize arsenic and nitrate concentrations (engaging OWRD will be necessary).

A planning-level cost estimate for each ASR alternative is presented in Table 6. A detailed breakdown of the planning-level cost estimate is provided in Attachment D. The planning-level cost estimate includes:

- Infrastructure improvements needed to convey water from the source to the receiving well (e.g., conveyance, pump stations, etc.)
- Retrofits to existing ASR wells (i.e., reconfiguration of above-ground piping, instrumentation and controls, and down-hole equipment)
- Retrofits to water sources (i.e., reconfiguration of above-ground piping, instrumentation and controls)
- Engineering and hydrogeologic consulting services
- Permitting costs (i.e., ASR limited license application).

Table 6. Planning-Level Costs for ASR Alternatives.

Source Water	Receiving Well	Planning-Level Development Cost (2022 Dollars)	Potential Expenses Not Included in Cost Estimate
Well No. 5	Well No. 2	$1,110,000	▪ Measures required to minimize arsenic and nitrate ▪ Well rehabilitation and/or repair (if necessary)
	Well No. 4	$1,130,000	▪ Measures required to minimize arsenic and nitrate ▪ Well rehabilitation and/or repair (if necessary)
	Well No. 6	$2,010,000	▪ Measures required to minimize arsenic and nitrate ▪ Well rehabilitation and/or repair (if necessary)
	New Well	$6,410,000	▪ Measures required to minimize arsenic and nitrate
Treated Columbia River Water (RWS)	Well No. 2	$1,720,000	▪ Well rehabilitation and/or repair (if necessary)
	Well No. 4	$1,740,000	▪ Well rehabilitation and/or repair (if necessary)
	Well No. 6	$1,080,000	▪ Well rehabilitation and/or repair (if necessary)
	New Well	$5,780,000	

6. Conclusions and Recommendations

The City of Hermiston is considering implementing ASR to: (1) providing a water supply source to meet increasing summer demands (ASR provides additional volume of water because the City's critical area allocation has been maxed out), (2) mitigate declining groundwater levels in the City's basalt wells to improve the long-term sustainability of the supply, and (3) improve groundwater quality issues (i.e., the elevated temperature and sulfur odor at Well No. 6). The City has multiple viable options for ASR source water and ASR wells. This TM identified eight initial alternatives for ASR, each involving a unique combination of source water and ASR wells. An ASR limited license application may include one or more of these alternatives depending on future needs of the City. All alternatives appear to be able to store a meaningful volume of water for the City.

Based on an analysis of pros and cons of each alternative: (1) the most promising options for and ASR well include either retrofitting existing Well No. 6 for ASR or constructing a new well for ASR, and (2) the most promising options for source water include Well No. 5 or treated water from the RWS RWTP. It is not clear at this time which source water option is more attractive because treated water from the RWS RWTP is relatively expensive (Anderson Perry, 2019) and it is not clear what technically feasible, practical, and cost-effective measures will be required to minimize elevated concentrations of arsenic and nitrate in Well No. 5 (engagement with OWRD is needed).

GSI recommends the following next steps for implementation of ASR in the City of Hermiston. The steps are organized in chronological order:

- **Reduce Uncertainties Related to Elevated Arsenic/Nitrate in Well No. 5 and Conceptual Design of a New Well.** Engage with treatment specialists and OWRD with partner agencies (OHA and DEQ) to reduce uncertainties related to the following elements of the project:
    - Identify the technically feasible, practical, and cost-effective measures that will be required to minimize elevated concentrations of arsenic and nitrate in Well No. 5.
    - Understand OWRD requirements for the design of a new well, and how that might affect the potential yield and storage volume at the well. In the past, OWRD has restricted the open interval of basalt wells to 100 feet, which may limit the productivity of the well excessively. However, OWRD may consider longer open intervals based on water level measurements or other regional data.

- **Water Level Monitoring.** Monitor the water level in Well No. 5 once per year in February or March to confirm that water levels in the aquifer are stable (i.e., not in a state of decline).

- **Water Quality Sampling.** The source water quality data evaluated in this TM were obtained from OHA's online drinking water quality database, and do not represent the full suite of ASR constituents. Therefore, we recommend collecting a water quality sample from the RWS RWTP and Well No. 5 and analyzing the sample for the full suite of ASR constituents, which includes common ions, metals, and the SDWA suite of organic and inorganic compounds. We also recommend obtaining samples from one or more wells that may be candidates for ASR development (e.g., Well No. 6) for analysis of metals and common ions in native groundwater. The groundwater quality and source water quality data should be evaluated with a geochemical model to assess whether mixing between source water and native basalt groundwater may result in adverse impacts to the ASR well.

- **Confirm Current Well Performance of Each Candidate ASR Well.** ASR storage volumes were estimated based on well testing of Well No. 2, Well No. 4, and Well No. 6 when the wells were installed. We recommend evaluation of *current* well performance by conducting a constant-rate aquifer test using the City's existing down-hole equipment and SCADA system. The duration of the test is flexible depending on operational constraints, but it would ideally be performed for at least 24 hours.

- **Well Condition Assessment.** Well No. 5 was constructed in 1977 (45 years ago), Well No. 2 was constructed in 1990 (32 years ago), Well No. 4 was constructed in 1968 (54 years ago), and Well No. 6 was constructed in 1992 (30 years ago). The first step in implementing ASR using any of these wells should be a well condition assessment, which would include a down-hole video to assess casing integrity (if no recent videos have been performed), open borehole stability, a well brushing, etc. The down-hole video would require removal of the pump from the well. We understand that the

pump is going to be pulled at Well No. 5 in 2023, which would be the ideal time for the well condition assessment at the well.

- **ASR Limited License Application.** OWRD requires an ASR Limited License to recharge the CRBG. OWRD processes ASR Limited License applications in 12 months to 16 months. We recommend applying for an ASR Limited License if no fatal flaws are identified based on the additional water quality sampling and geochemical modeling, well performance testing, evaluation of arsenic/nitrate reduction, evaluation of comingling, and well condition assessment.

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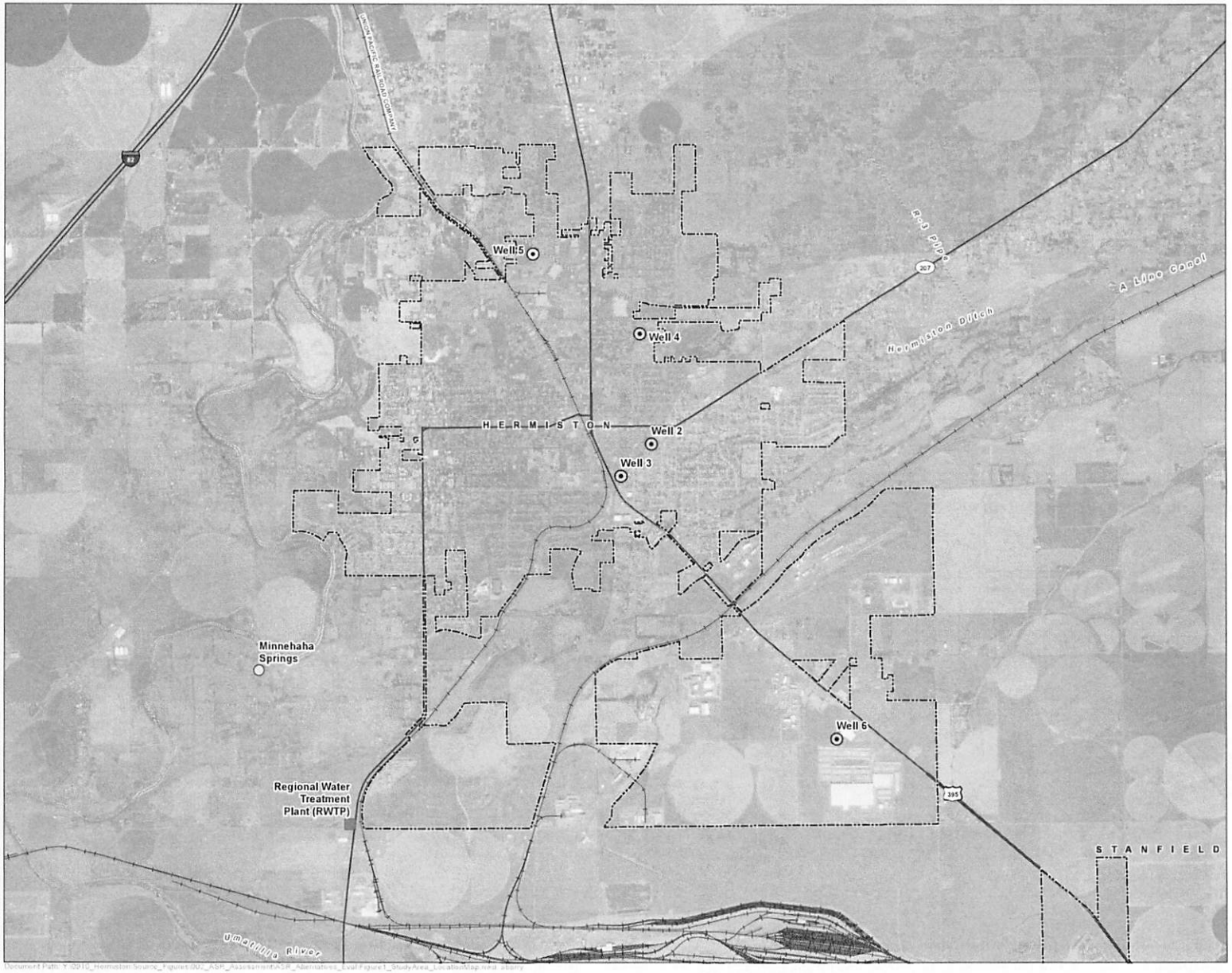


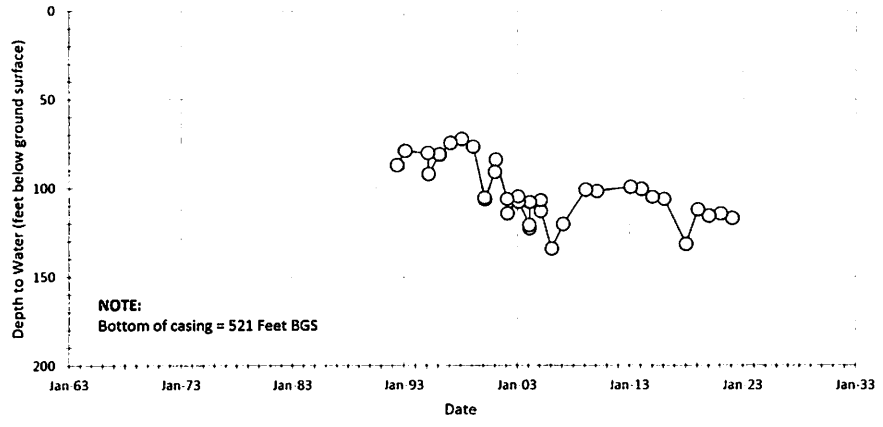
FIGURE 1

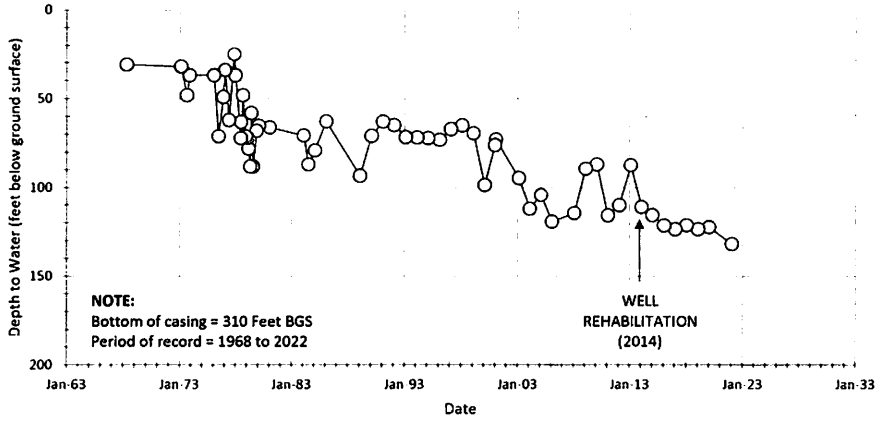
Study Area Location Map

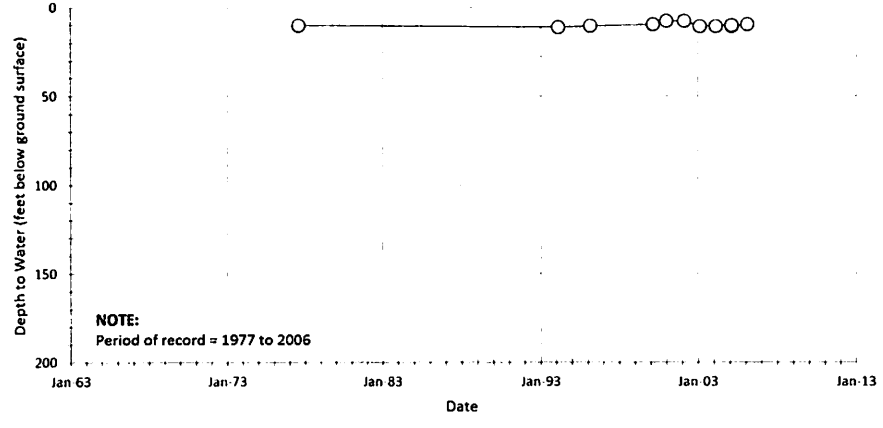
City of Hermiston
ASR Alternatives Evaluation

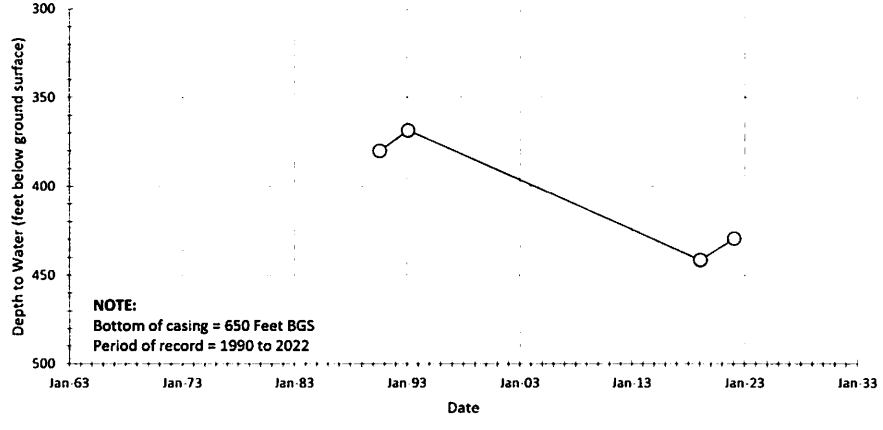
LEGEND

- Alluvial Well
- Basalt Well
- Minnehaha Springs
- Regional Water Treatment Plant (RWTP)
- Extent of Hermiston Trough
- City Boundary (Study Area)
- Railroad
- Major Road
- Watercourse
- Waterbody



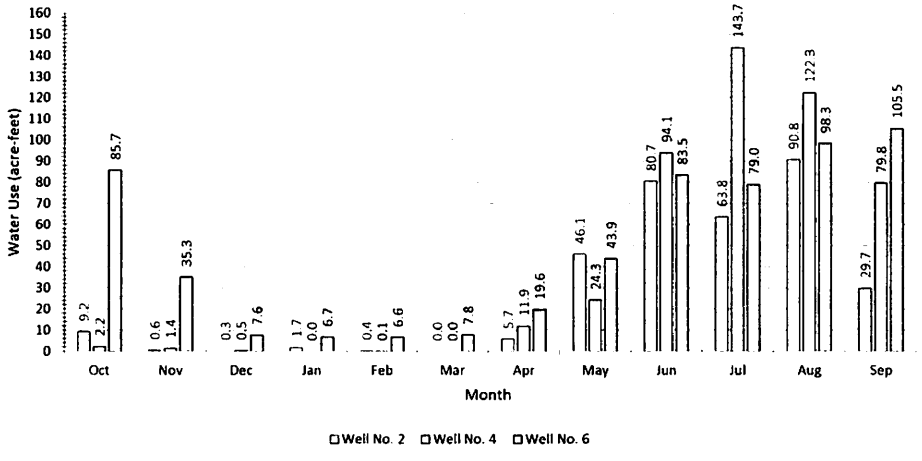


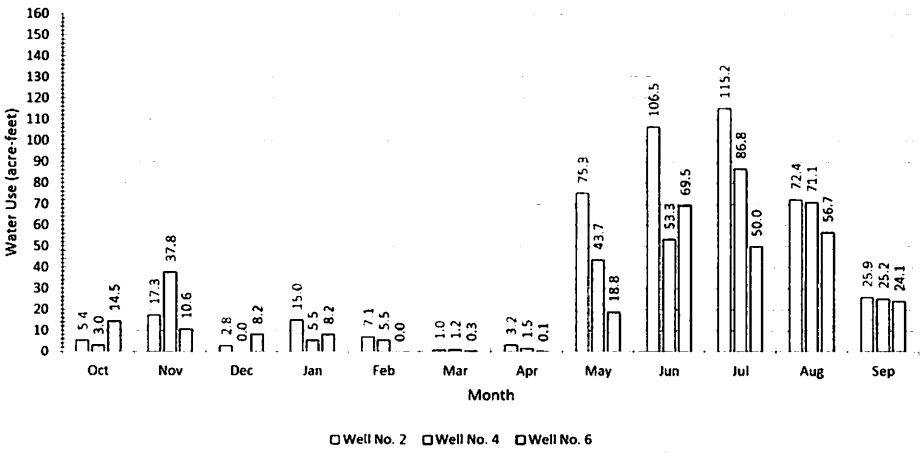


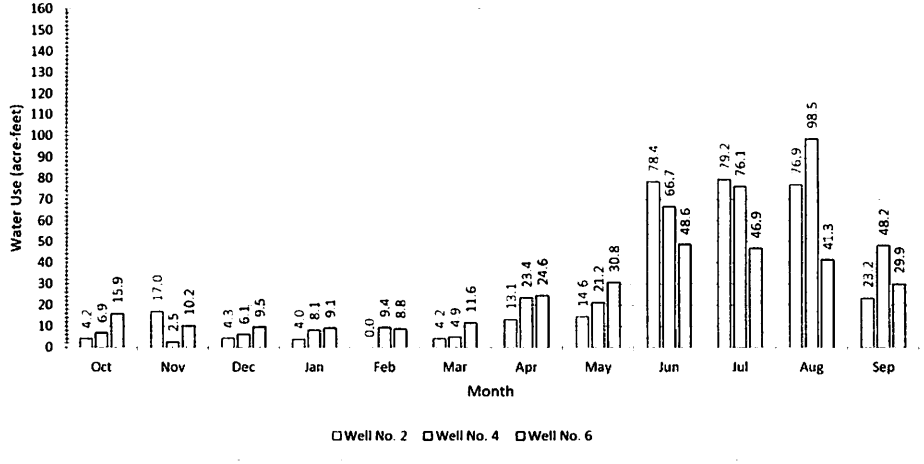


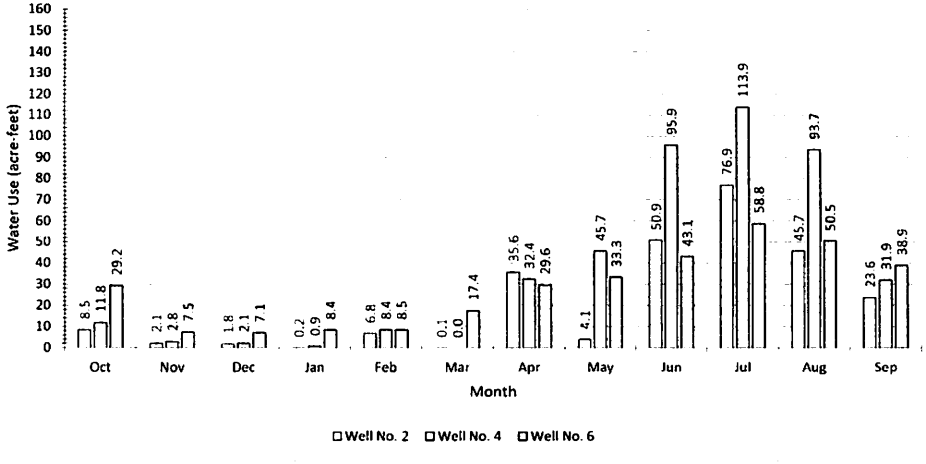
GSI Water Solutions, Inc.

FIGURE 2
Depth to Groundwater in City of Hermiston Wells
City of Hermiston ASR Alternatives Analysis









NOTE:
The 2017 and 2018 water years are not shown because Well No. 5 was offline for rehabilitation and basalt well useage was atypically high

GSI Water Solutions, Inc.

FIGURE 3
Water Use at City of Hermiston Basalt Wells
City of Hermiston ASR Alternatives Analysis

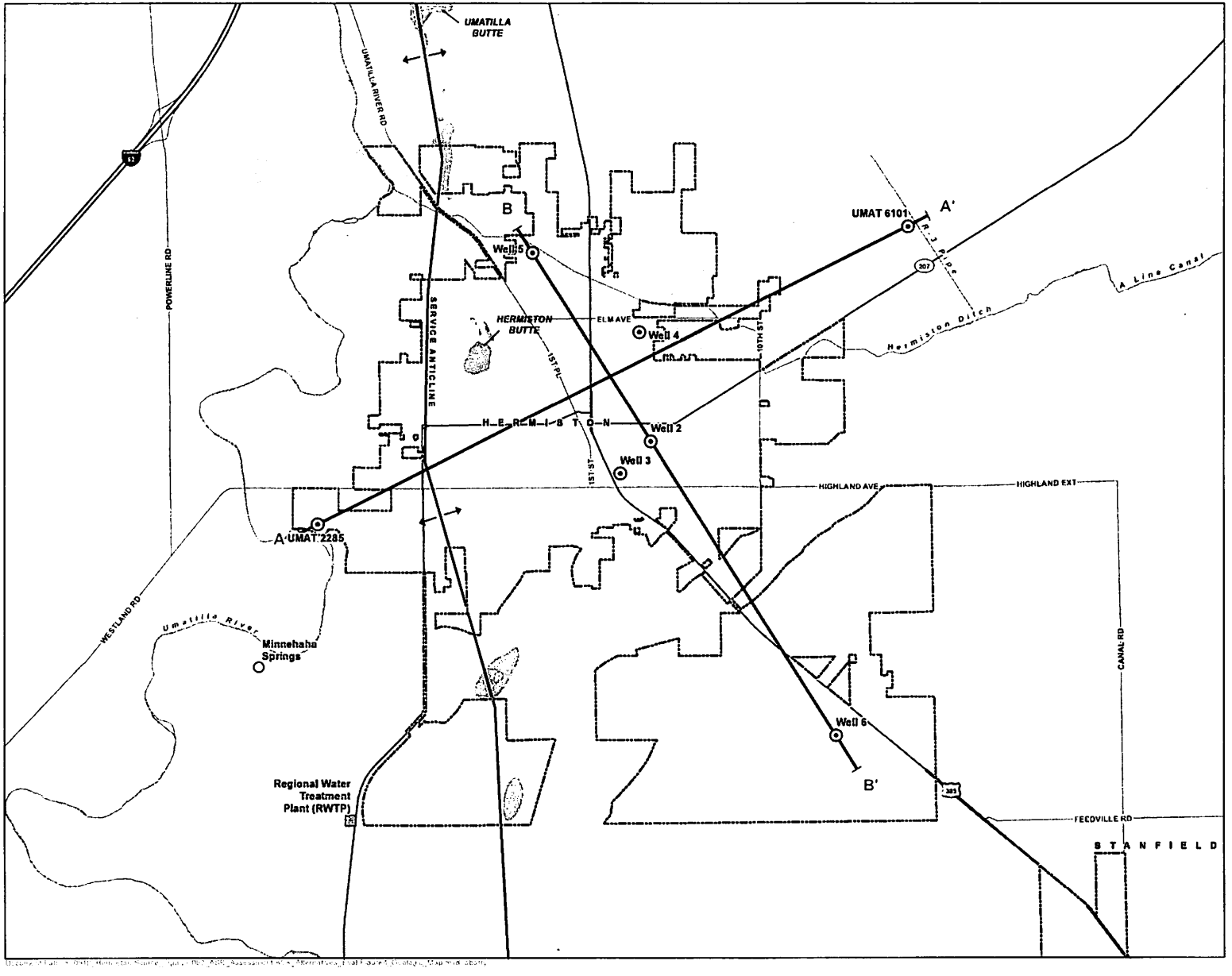


FIGURE 4

Geologic Map

City of Hermiston
ASR Alternatives Evaluation

LEGEND

- Well
- Minnehaha Springs
- Regional Water Treatment Plant (RWTP)
- Anticline
- Cross Section Line

Surficial Geology

Alluvist Deposits

- Unconsolidated Alluvial Deposits

Columbia River Basalt Group

- Saddle Mountain Basalt (Tp)

All Other Features

- City Boundary
- Major Road
- Watercourse
- Waterbody

NOTE
Eolian deposits are not shown for clarity.

N

0 1,500 3,000 4,500
Feet

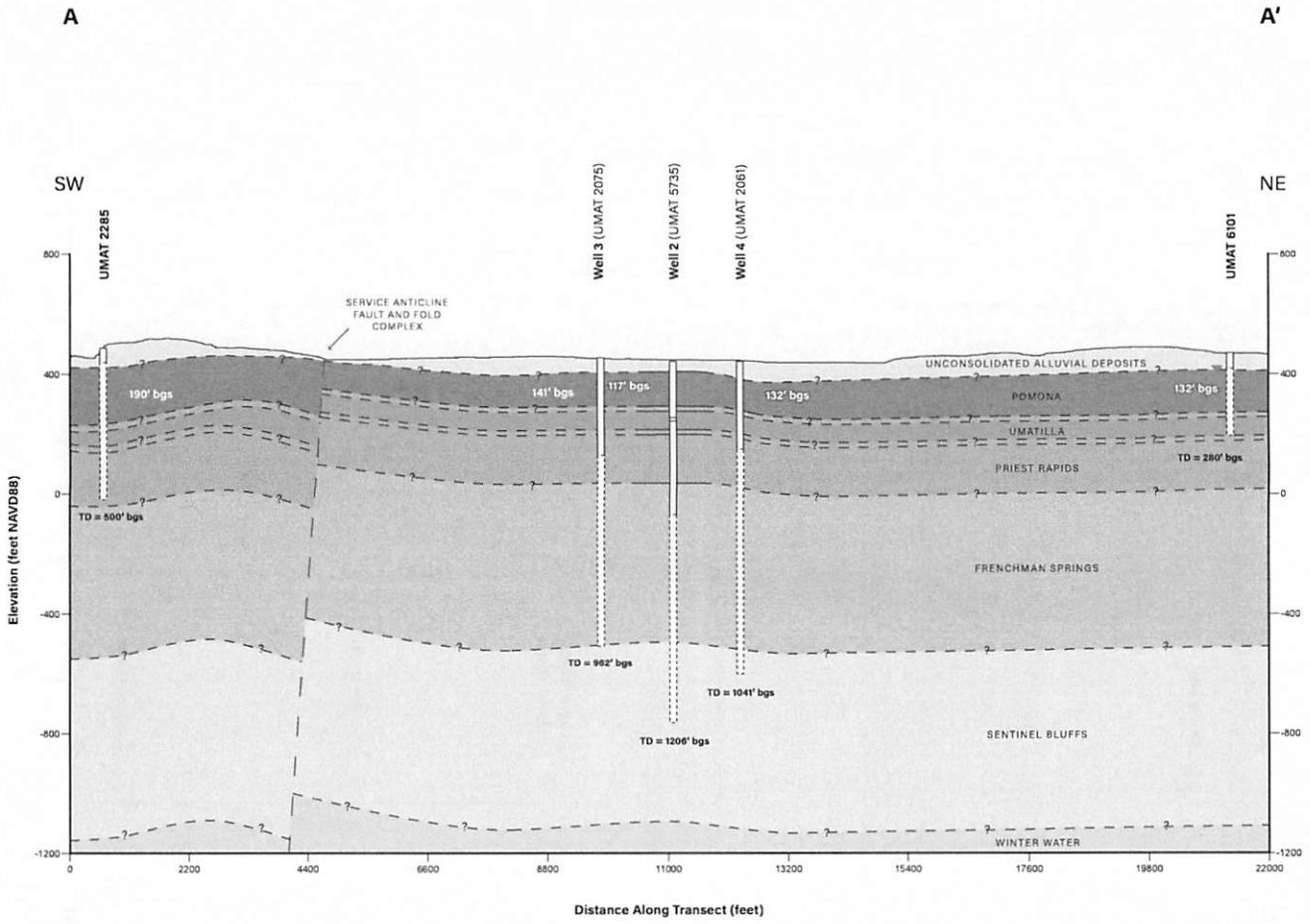
Date: October 7, 2022
Data Sources: BLM, ESRI, ODOT, USGS, DOGAMI

GSI Water Solutions, Inc.

FIGURE 5

Cross Section A

City of Hermiston
ASR Alternatives Evaluation



GEOLOGY LEGEND

- Fault

Alluvial Deposits

- Unconsolidated Alluvial Deposits

Columbia River Basalt Group

Brown layers indicate interbeds

- Pomona Member
- Umatilla Member
- Priest Rapids Member
- Frenchman Springs Member
- Sentinel Bluffs Member
- Winter Water Member

WELL LEGEND

- Blank Casing
- Screen
- Open Borehole
- Static Water Level

NOTES

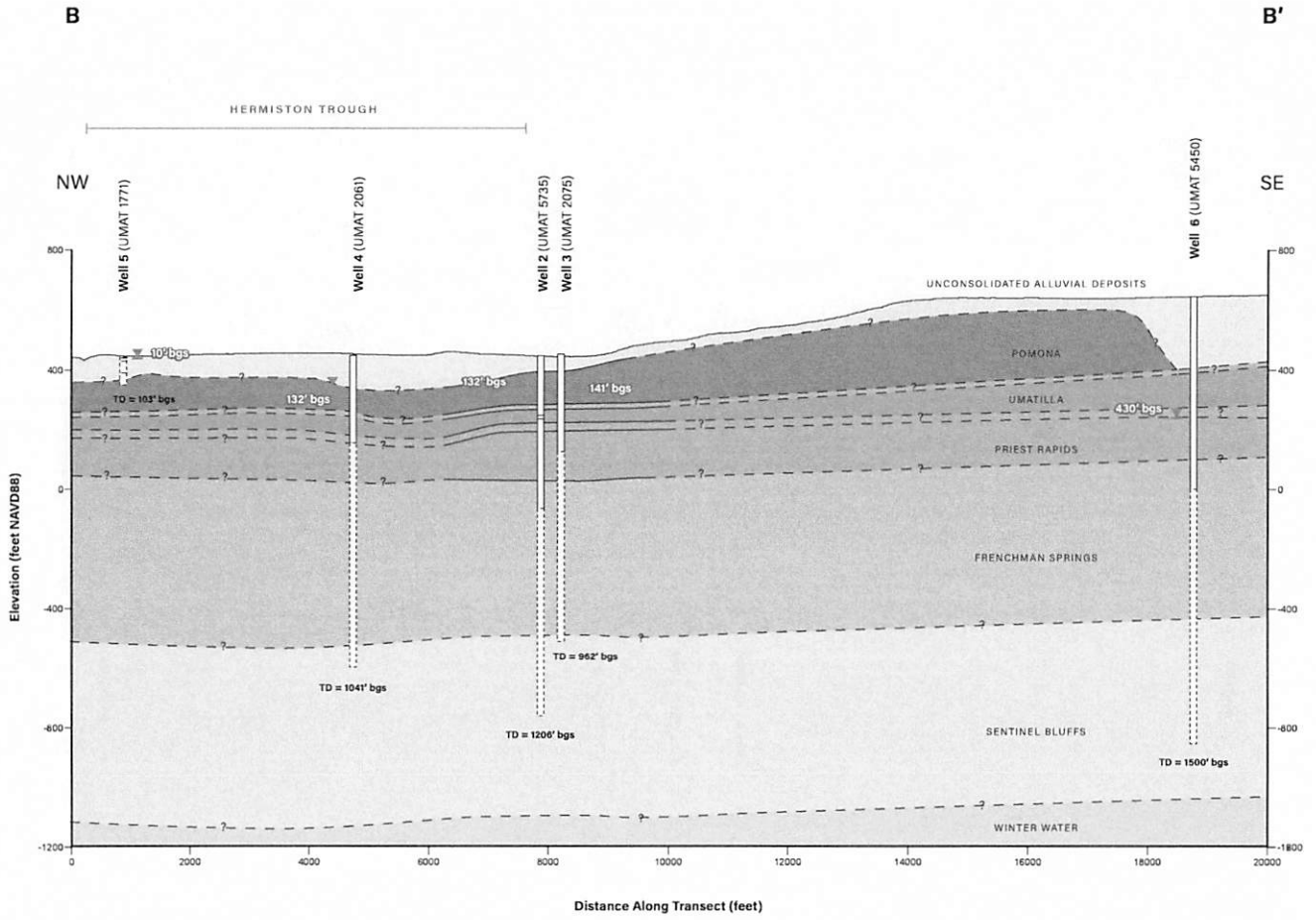
bgs: below ground surface
TD: total depth
NAVD88: North American Vertical Datum of 1988

GSI Water Solutions, Inc.

FIGURE 6

Cross Section B

City of Hermiston
ASR Alternatives Evaluation



GEOLOGY LEGEND

- Fault

Alluvial Deposits

- Unconsolidated Alluvial Deposits

Columbia River Basalt Group
Brown layers indicate interbeds

- Pomona Member
- Umatilla Member
- Priest Rapids Member
- Frenchman Springs Member
- Sentinel Bluffs Member
- Winter Water Member

WELL LEGEND

- Blank Casing
- Screen
- Open Borehole
- Static Water Level

NOTES
bgs: below ground surface
TD: total depth
NAVD88: North American Vertical Datum of 1988

GSI Water Solutions, Inc.

ATTACHMENT A

Water Rights Evaluation

The City operates a public drinking water system (Public Water System Identification Number 4100372). The City's potable water supply is obtained from three sources:

- Groundwater from a shallow alluvial well (Well 5).
- Groundwater from deep basalt groundwater wells (Wells 2, 4, and 6). Well 1 and 3 also access the deep basalt groundwater aquifer, but are not currently in use.
- The Regional Water System (RWS), of which the City is a co-owner, which supplies both non-potable and potable water treated at the Regional Water Facility and Treatment Plant.

1.1 Water Rights

The City's water use is authorized by multiple water rights. The City diverts water from Well 5 under permit G-6831, which authorizes the use of up to 11.04 cfs (4,955 gpm) for municipal use. The City also holds five water right certificates for the use of water from the Columbia River Basalt aquifer, authorizing the use of up to 10.66 cfs (4,785 gpm) for municipal use. Although the City's basalt aquifer water rights authorize the use of water from Wells 1 – 4 and Well 6, currently, only Wells 2, 4, and 6 are in use. Combined, these wells have a maximum capacity equal to the City's maximum rate of use under its five water right certificates. Permit S-40601 authorizes the use of water from Minnehaha Springs, which has not yet been developed. The Port of Umatilla holds the water right authorizing diversion of water for the Regional Water System.

The City's water rights are shown in Exhibit 2.

Exhibit 2. City of Hermiston water sources and water rights.

Source	Application	Permit	Certificate/ Transfer	Priority Date	Source	Authorized Rate (cfs)	Authorized Rate (mgd)	Annual Volume Limit (MG)
City of Hermiston Water Rights								
Alluvial Aquifer	G-7380	G-6831	-	5/24/1976	WELL 5	11.04	7.1	N/A
Basalt Aquifer	U-310	U-282	19619	6/3/1949	WELL 2	2.23	1.4	Variable 2019 - 2021 allocations ranged from 644 MG to 699 MG.
	G-3927	G-3467	38852	5/11/1967	WELL 4	4.46	2.9	
	G-11299	G-10418	87262	8/15/1984	WELL 6	0.74	0.5	
	U-179	U-169	87263	9/28/1945	WELL 1	1	0.6	
				9/28/1945	WELL 6			
	G-853	G-763	87264	2/5/1958	WELL 3	2.23	1.4	
				2/5/1958	WELL 6			
Surface/ Springs	S-53827	S-40601	-	1/2/1976	Minnehaha Springs	7	4.5	N/A
Port of Umatilla Surface Water Right								
Columbia River	S-58245	S-49497	94987, 94223, 93670, 91589	1/19/1979	Columbia River	City's portion: 15.60 cfs; 3.40 developed potable supply	City's portion: 10.08; 2.20 developed potable supply	N/A

1.2 Water Use

The City relies on Well 5 as its primary source of supply. Basalt wells 2, 4, and 6 typically provide additional supply during the summer months. However, during 2017 and 2018, while rehabilitation work was underway on Well 5, the City relied on its Basalt wells throughout the year. During the 2021 water year, the City obtained over 65 percent of its water supply from Well 5. Exhibit 2 shows 2017 through 2021 water use from each of the City's water sources. The City's 2017 through 2021 total annual water use is shown in Exhibit 3.

Exhibit 3. City of Hermiston Water Use by Water Right

Source	Source	Authorized Rate (cfs)	Authorized Rate (mgd)	Annual Volume Limit (MG)	2017	2018	2019	2020	2021
Alluvial Aquifer	WELL 5	11.04	7.1	N/A	526	720	1009	1013	1118
Basalt Aquifer	WELL 2	2.23	1.4	Variable based on critical groundwater area allocations. 2019 - 2021 allocations ranged from 644 MG to 699 MG.	212	281	146	104	84
	WELL 4	4.46	2.9		562	396	109	121	143
	WELL 6	0.74	0.5		249	122	85	94	108
		1	0.6						
		2.23	1.4						
Surface/ Springs	Minnehaha Springs	7	4.5	N/A	0	0	0	0	0
Columbia River	Columbia River	City's portion: 3.4	City's portion: 2.2	N/A					

In evaluating opportunities for the use of water from the City's water sources for ASR, it's important to consider the utilization and seasonality of water use from the City's sources of supply in comparison to the rates authorized by the City's water rights. The following sections briefly describe the City's utilization of water from its municipal water sources with consideration of the potential for ASR development.

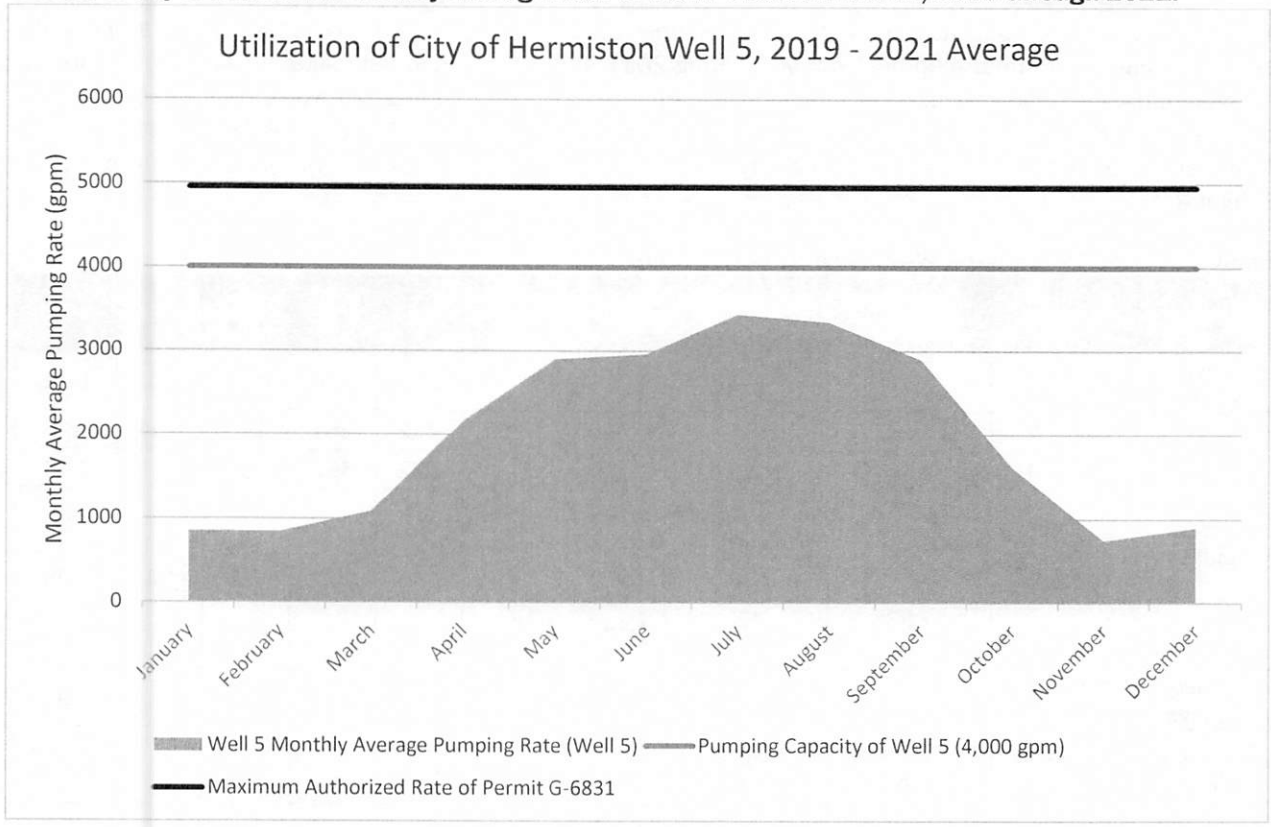
1.2.1 Alluvial Aquifer (Well 5)

Well 5 is the City's only alluvial aquifer well and the City's primary water source, From 2019 through 2021, Well 5 provided approximately 67 percent of the City's summertime peak demands and over 90 percent of winter demands. Exhibit 4 shows the average monthly pumping rate based on water use from 2019 through 2021. On average, Well 5 produced nearly 3500 gpm during July, equivalent to over 20 hours per day of pumping and effectively full utilization of the 4,000 gpm capacity of Well 5. However, from November through March, average pumping rates ranged from 750 gpm to 1,100 gpm.

The City does not have recent water level measurements for Well 5. However, measurements made between 1994 and 2006 showed minor fluctuations in water level, and water system operators have indicated that the water levels have remained relatively constant (Water System Master Plan). The City should consider making regular water level measurements to confirm that Well 5 water levels remain constant.

Low utilization during the winter months and stable water levels make Well 5 a candidate for use as a source of water supply for injection into the basalt aquifer as part of an ASR pilot testing project from a water availability standpoint.

Exhibit 4. City of Hermiston Monthly Average Rate of Water Use from Well 5, 2019 through 2021.



1.2.2 Basalt Aquifer Wells 2, 4, and 6

The City's basalt wells are used to meet peak demands during the summer months. Exhibit 5 shows monthly average production from the City's alluvial and basalt wells from 2019 through 2021. The City's basalt wells are located in the Stage Gulch Critical Groundwater Area (Subarea A). The annual volume of water use from the City's deep basalt wells is limited by the City's annual groundwater allocations. The City's recent allocations and water use are shown in Exhibit 6.

Exhibit 5. City of Hermiston Monthly Average Monthly Water Use from Groundwater Sources

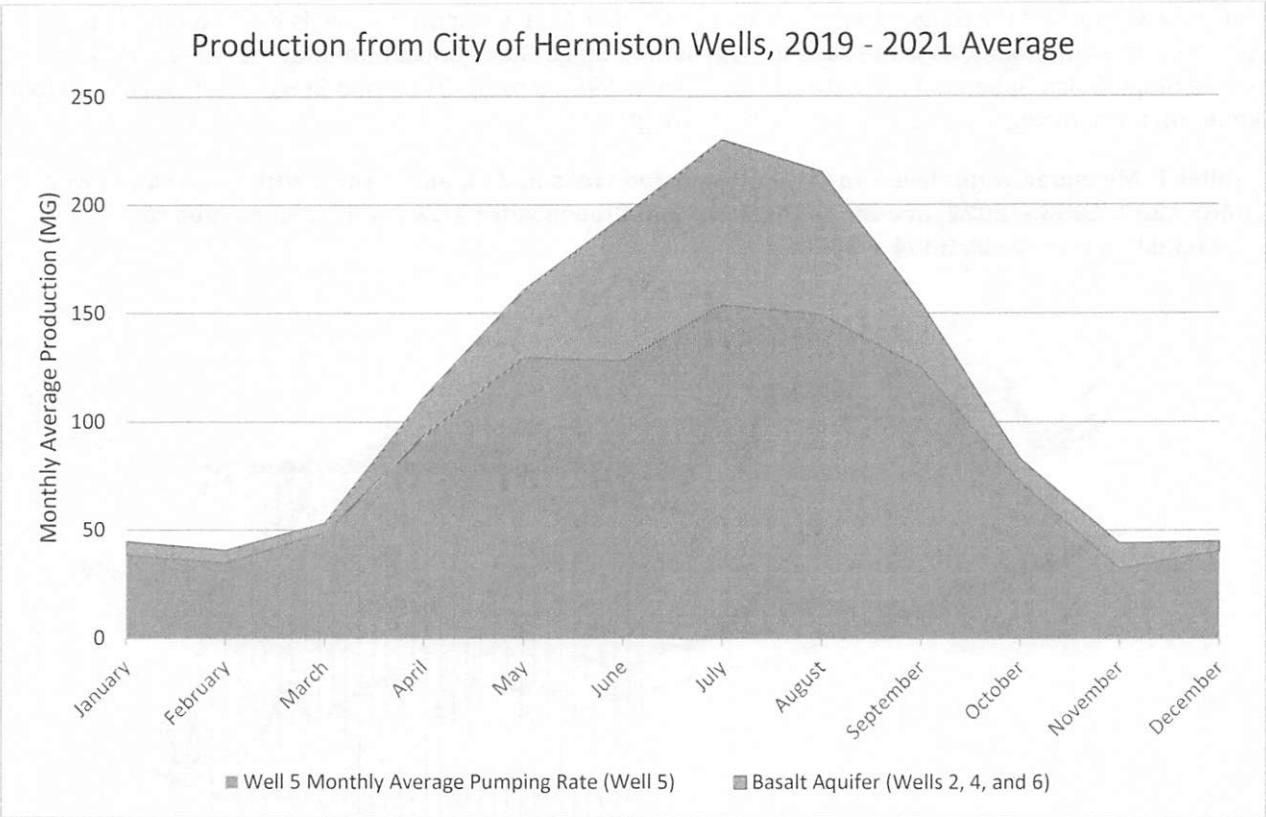


Exhibit 6: City of Hermiston Stage Gulch Critical Groundwater Subarea A Allocations and Water Use, 2011 through 2021

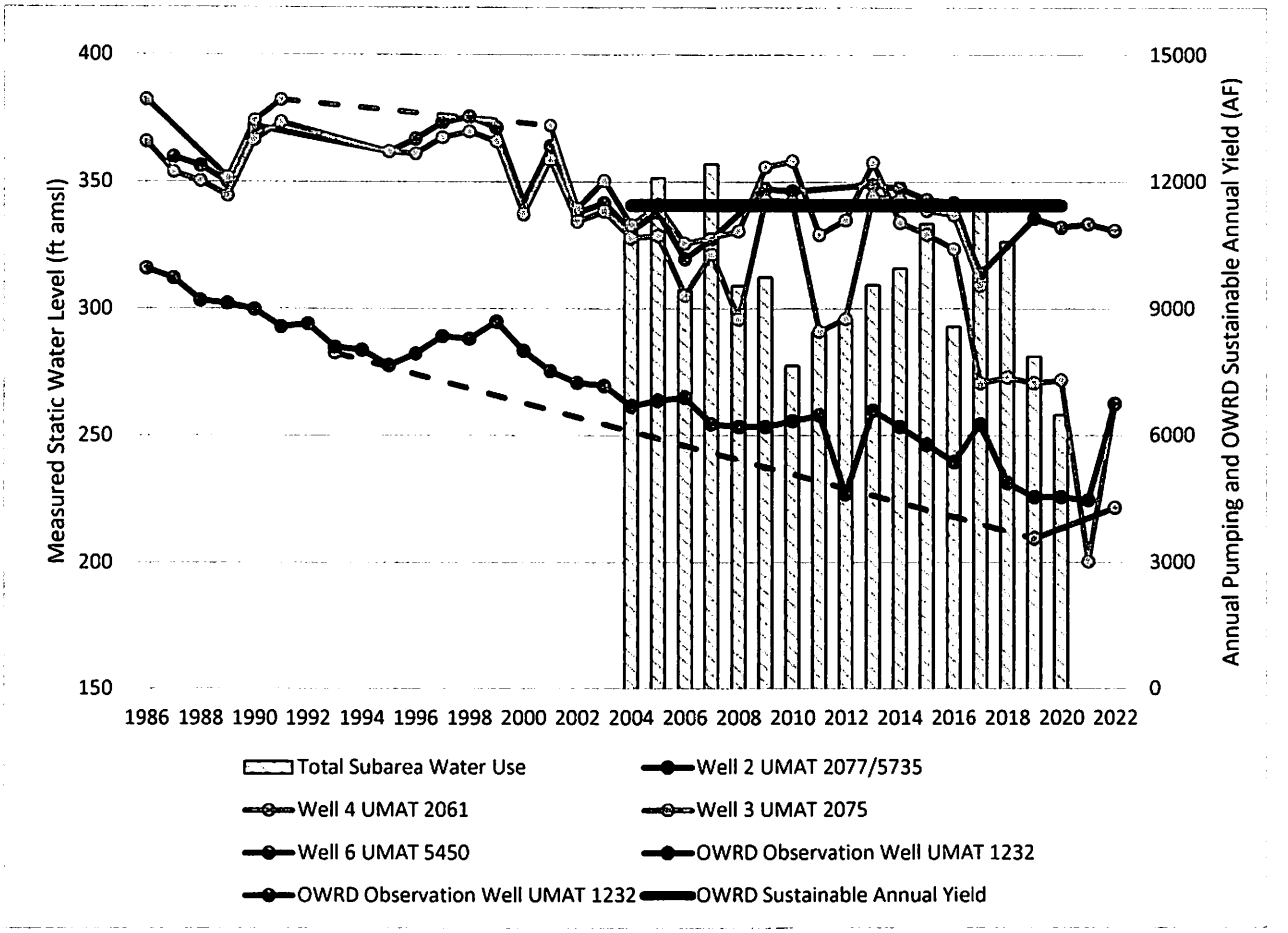
Year	Allocation (MG)	Use (MG)
2011	807	897
2012	743	740
2013	767	392
2014	765	427
2015	771	502
2016	771	453
2017	771	1,023
2018	438	799
2019	644	340
2020	699	319
2021	652	335
Average	**712**	**566**

The City's use of water from the basalt aquifer has been variable in recent years, in some years exceeding and other years remaining well short of OWRD's allocation. From 2011 through 2021, the City's use of

groundwater from Wells 2, 4, and 6 has fluctuated, but generally declined, and the City's critical groundwater area allocations have followed.

Since the creation of the Stage Gulch Critical Groundwater Area, groundwater levels have continued to decline in the City's wells, as is the case throughout the Stage Gulch Critical Groundwater Area. Exhibit 7 shows Stage Gulch Subarea A groundwater levels from 1986 through 2022 and Stage Gulch Subarea A total groundwater pumping (by all users) from 2004 through 2020.

Exhibit 7: Measured water levels in City of Hermiston Wells 2, 3, 4, and 6 and OWRD observation well UMAT 1232, 1986 – 2022, and Stage Gulch Critical Groundwater Area pumping compared to sustainable annual yield, 2004 – 2020.



The City's water system master plan recommends that the City develop additional basalt wells to increase the City's ability to use water from the Basalt Aquifer. However, as described in the Master Plan, it is not possible to obtain new water rights for the Columbia River Basalt Aquifer in the vicinity of Hermiston. Furthermore, as shown in Exhibit 5, the City frequently utilizes the full authorized volume of water under its critical groundwater allocations in many years. The basalt aquifer is an excellent target aquifer for ASR projects. Declining groundwater levels indicate that there is space for storage, and storage of water under ASR pilot projects would increase both the maximum rate and volume of water available to the City.

1.2.3 Regional Water System

Hermiston is a partner in the development of the Regional Water System (RWS). The RWS provides water for both potable and non-potable uses. The City hold allocations for both potable and non-potable water. The RWS intake pump is located in the McNary Pool of the Columbia River and has developed firm capacity of 13,900 gpm. A 42-inch transmission pipeline conveys raw water to the intersection of Hermiston Highway (Oregon State Highway 207) and Feedville Road. The City holds an allocation of 7,000 gpm of raw water capacity in the intake pump station, of which 3,000 gpm has been developed. The RWS Water Treatment Plant (WTP), also located at the intersection of the Hermiston Highway and Feedville Road, provides potable water with a developed capacity of 1,782 gpm. The City holds an allocation of 1,527 gpm of developed capacity in the RWS WTP. The only other water user with developed capacity in the RWS WTP is Shearer's Foods. Due to a March 2022 fire at the Shearer's Foods plant, Shearer's developed allocation of 255 gpm is not currently in use.

As described in the City's water system master plan, the City currently utilizes the RWS as a backup water source due to its reliable water production and relative high cost of treated water from the RWS.

1.2.4 Minnehaha Springs

The City holds permit S-40601 for the use of up to 7.0 cfs (3,140 gpm) from Minnehaha Springs. To date, the City has not developed the springs as a source of water supply. The City's 2019 Water System Master Plan cites as disadvantages that a portion of the springs appear to be on private property, water quality concerns due to susceptibility of the springs to microbiological and nitrate contamination, and the distance of the springs from the City's other wells and water distribution system.

Additional concerns include that permit S-40601 is relatively junior in priority on the Umatilla River. The springs discharge to the Umatilla River upstream of senior water right holders who may be able to make a valid call on the City's use of the springs during the irrigation season, including in October and March.

Finally, the City submitted an application to extend permit S-40601 in 1999. The extension application remains under review. The long delay is likely attributable to the need for the Oregon Department of Fish and Wildlife to develop fish persistence conditions, which may further limit the use of water from the springs throughout the year, including during the non-irrigation season.

Despite these disadvantages and regulatory obstacles, water may be available for diversion from the springs with sufficient frequency during the winter months for the City to consider the use of the springs as a source of water for ASR purposes.

ATTACHMENT B

Water Quality Data

Table B.1. Source Water Quality Data.
City of Hermiston ASR Feasibility Evaluation.

	Basis for ASR Standard	ASR Standard	Units	Well 5 EP-C SRC-CA		Treated Columbia River Water from the RWS EP-F SRC-FA	
1,2-DIBROMO-3-CHLOROPROPANE	MCL	0.0001	MG/L	ND	8/3/2020	ND	8/3/2020
2,4,5-TP	MCL, MML	0.005	MG/L	ND	8/3/2020	ND	8/3/2020
2,4-D	MCL, MML	0.035	MG/L	ND	8/3/2020	ND	8/3/2020
ATRAZINE	MCL	0.0015	MG/L	ND	8/3/2020	ND	8/3/2020
BENZO(A)PYRENE	MCL	0.0001	MG/L	ND	8/3/2020	ND	8/3/2020
BHC-GAMMA	MCL, MML	0.0001	MG/L	ND	8/3/2020	ND	8/3/2020
CARBOFURAN	MCL	0.02	MG/L	ND	8/3/2020	ND	8/3/2020
CHLORDANE	MCL	0.001	MG/L	ND	8/3/2020	ND	8/3/2020
DALAPON	MCL	0.1	MG/L	ND	8/3/2020	ND	8/3/2020
DI(2-ETHYLHEXYL) ADIPATE	MCL	0.2	MG/L	ND	8/3/2020	ND	8/3/2020
DI(2-ETHYLHEXYL) PHTHALATE	MCL	0.003	MG/L	ND	8/3/2020	ND	8/3/2020
DINOSEB	MCL	0.0035	MG/L	ND	8/3/2020	ND	8/3/2020
DIQUAT	MCL	0.01	MG/L	ND	8/3/2020	ND	8/3/2020
ENDOTHALL	MCL	0.0005	MG/L	ND	8/3/2020	ND	8/3/2020
ENDRIN	MCL, MML	0.0001	MG/L	ND	8/3/2020	ND	8/3/2020
ETHYLENE DIBROMIDE	MCL	0.000025	MG/L	ND	8/3/2020	ND	8/3/2020
GLYPHOSATE	MCL	0.35	MG/L	ND	8/3/2020	ND	8/3/2020
HEPTACHLOR	MCL	0.0002	MG/L	ND	8/3/2020	ND	8/3/2020
HEPTACHLOR EPOXIDE	MCL	0.0001	MG/L	ND	8/3/2020	ND	8/3/2020
HEXACHLOROBENZENE	MCL	0.0005	MG/L	ND	8/3/2020	ND	8/3/2020
HEXACHLOROCYCLOPENTADIENE	MCL	0.025	MG/L	ND	8/3/2020	ND	8/3/2020
LASSO			MG/L	ND	8/3/2020	ND	8/3/2020
METHOXYCHLOR	MCL, MML	0.02	MG/L	ND	8/3/2020	ND	8/3/2020
OXAMYL	MCL	0.1	MG/L	ND	8/3/2020	ND	8/3/2020
PENTACHLOROPHENOL	MCL	0.0005	MG/L	ND	8/3/2020	ND	8/3/2020
PICLORAM	MCL	0.0005	MG/L	ND	8/3/2020	ND	8/3/2020
SIMAZINE	MCL	0.002	MG/L	ND	8/3/2020	ND	8/3/2020
TOTAL POLYCHLORINATED BIPHENYLS (PCB)	MCL	0.00025	MG/L	ND	8/3/2020	ND	8/3/2020
TOXAPHENE	MCL	0.0015	MG/L	ND	8/3/2020	ND	8/3/2020
ANTIMONY, TOTAL	MCL	0.003	MG/L	ND	44019	ND	44019
ARSENIC	MCL	0.005	MG/L	0.0062	7/7/2020	ND	7/7/2020
BARIUM	MCL	1	MG/L	ND	44019	ND	44019
BERYLLIUM, TOTAL	MCL	0.002	MG/L	ND	7/7/2020	ND	7/7/2020
CADMIUM	MCL	0.0025	MG/L	ND	44019	ND	44019
CHROMIUM	MCL	0.05	MG/L	ND	7/7/2020	ND	7/7/2020
CYANIDE	MCL	0.1	MG/L	ND	44019	ND	44019
FLUORIDE	MCL	2.0	MG/L	0.37	7/7/2020	ND	7/7/2020
LEAD	MCL	0.0075	MG/L	ND	44019	ND	44019
MERCURY	MCL	0.001	MG/L	ND	7/7/2020	ND	7/7/2020
NICKEL			MG/L	ND	44019	ND	44019
NITRATE	MCL	5.0	MG/L	4.89	7/7/2020	0.13	7/7/2020
NITRATE-NITRITE			MG/L	4.89	44019	0.13	44019
SELENIUM	MCL	0.025	MG/L	ND	7/7/2020	ND	7/7/2020
SODIUM			MG/L	47.4	44019	3.9	44019
THALLIUM, TOTAL	MCL	0.001	MG/L	ND	7/7/2020	ND	7/7/2020
1,1,1-TRICHLOROETHANE	MCL, MML	0.001	MG/L	ND	44019	ND	44019
1,1,2-TRICHLOROETHANE	MCL	0.0025	MG/L	ND	7/7/2020	ND	7/7/2020
1,1-DICHLOROETHYLENE	MCL, MML	0.0035	MG/L	ND	44019	ND	44019
1,2,4-TRICHLOROBENZENE	MCL	0.035	MG/L	ND	7/7/2020	ND	7/7/2020
1,2-DICHLOROETHANE	MCL, MML	0.0025	MG/L	ND	44019	ND	44019
1,2-DICHLOROPROPANE	MCL	0.0025	MG/L	ND	7/7/2020	ND	7/7/2020
BENZENE	MCL, MML	0.0025	MG/L	ND	44019	ND	44019
CARBON TETRACHLORIDE	MCL, MML	0.0025	MG/L	ND	7/7/2020	ND	7/7/2020
CHLOROBENZENE	MCL	0.05	MG/L	ND	44019	ND	44019
CIS-1,2-DICHLOROETHYLENE	MCL	0.035	MG/L	ND	7/7/2020	ND	7/7/2020
DICHLOROMETHANE	MCL	0.0025	MG/L	ND	44019	ND	44019
ETHYLBENZENE	MCL	0.35	MG/L	ND	7/7/2020	ND	7/7/2020
O-DICHLOROBENZENE	MCL	0.3	MG/L	ND	44019	ND	44019
P-DICHLOROBENZENE	MCL	0.0375	MG/L	ND	7/7/2020	ND	7/7/2020
STYRENE	MCL	0.05	MG/L	ND	44019	ND	44019
TETRACHLOROETHYLENE	MCL	0.0025	MG/L	ND	7/7/2020	ND	7/7/2020
TOLUENE	MCL	0.5	MG/L	ND	44019	ND	44019
TRANS-1,2-DICHLOROETHYLENE	MCL	0.05	MG/L	ND	7/7/2020	ND	7/7/2020
TRICHLOROETHYLENE	MCL, MML	0.0025	MG/L	ND	44019	ND	44019
VINYL CHLORIDE	MCL, MML	0.001	MG/L	ND	7/7/2020	ND	7/7/2020
XYLENES, TOTAL	MCL	5	MG/L	ND	44019	ND	44019

Notes
ASR Injection Standards = Lowest value within MCL/2, MML/2, except disinfection by-products.
ASR Injection Standards for disinfection by-products = Lowest value within MCL, MML, or SMCL.
BOLD = detected
BOLD RED = exceeds regulatory standard
ASR = aquifer storage and recovery
RWS = Regional Water System
MCL = maximum contaminant level for drinking water
mg/L = milligram per liter
MML = groundwater maximum measurable level
ND = not detected

Table B.2. Receiving Water Quality Data.
City of Hermiston ASR Feasibility Evaluation.

	Basis for ASR Standard	ASR Standard	Units	Well 2 EP-A SRC-AA		Well 4 EP-B SRC-BA		Well 6 EP-D SRC-DA	
1,2-DIBROMO-3-CHLOROPROPANE	MCL	0.0002	MG/L	ND	7/31/2002	ND	8/3/2020	ND	8/3/2020
2,4,5-TP	MCL, MML	0.01	MG/L	ND	7/31/2002	ND	8/3/2020	ND	8/3/2020
2,4-D	MCL, MML	0.07	MG/L	ND	7/31/2002	ND	8/3/2020	ND	8/3/2020
ATRAZINE	MCL	0.0015	MG/L	ND	7/31/2002	ND	8/3/2020	ND	8/3/2020
BENZO(A)PYRENE	MCL	0.0002	MG/L	ND	7/31/2002	ND	8/3/2020	ND	8/3/2020
BHC-GAMMA	MCL, MML	0.0002	MG/L	ND	7/31/2002	ND	8/3/2020	ND	8/3/2020
CARBOFURAN	MCL	0.04	MG/L	ND	7/31/2002	ND	8/3/2020	ND	8/3/2020
CHLORDANE	MCL	0.002	MG/L	ND	7/31/2002	ND	8/3/2020	ND	8/3/2020
DALAPON	MCL	0.1	MG/L	ND	7/31/2002	ND	8/3/2020	ND	8/3/2020
DI(2-ETHYLHEXYL) ADIPATE	MCL	0.4	MG/L	ND	7/31/2002	ND	8/3/2020	ND	8/3/2020
DI(2-ETHYLHEXYL) PHTHALATE	MCL	0.006	MG/L	ND	7/31/2002	ND	8/3/2020	ND	8/3/2020
DINOSEB	MCL	0.007	MG/L	ND	7/31/2002	ND	8/3/2020	ND	8/3/2020
DIQUAT	MCL	0.02	MG/L	ND	7/31/2002	ND	8/3/2020	ND	8/3/2020
ENDOTHALL	MCL	0.001	MG/L	ND	7/31/2002	ND	8/3/2020	ND	8/3/2020
ENDRIN	MCL, MML	0.0002	MG/L	ND	7/31/2002	ND	8/3/2020	ND	8/3/2020
ETHYLENE DIBROMIDE	MCL	0.00005	MG/L	ND	7/31/2002	ND	8/3/2020	ND	8/3/2020
GLYPHOSATE	MCL	0.7	MG/L	ND	7/31/2002	ND	8/3/2020	ND	8/3/2020
HEPTACHLOR	MCL	0.0004	MG/L	ND	7/31/2002	ND	8/3/2020	ND	8/3/2020
HEPTACHLOR EPOXIDE	MCL	0.0002	MG/L	ND	7/31/2002	ND	8/3/2020	ND	8/3/2020
HEXACHLOROBENZENE	MCL	0.001	MG/L	ND	7/31/2002	ND	8/3/2020	ND	8/3/2020
HEXACHLOROCYCLOPENTADIENE	MCL	0.05	MG/L	ND	7/31/2002	ND	8/3/2020	ND	8/3/2020
LASSO			MG/L	ND	7/31/2002	ND	8/3/2020	ND	8/3/2020
METHOXYCHLOR	MCL, MML	0.04	MG/L	ND	7/31/2002	ND	8/3/2020	ND	8/3/2020
OXAMYL	MCL	0.2	MG/L	ND	7/31/2002	ND	8/3/2020	ND	8/3/2020
PENTACHLOROPHENOL	MCL	0.001	MG/L	ND	7/31/2002	ND	8/3/2020	ND	8/3/2020
PICLORAM	MCL	0.001	MG/L	ND	7/31/2002	ND	8/3/2020	ND	8/3/2020
SIMAZINE	MCL	0.004	MG/L	ND	7/31/2002	ND	8/3/2020	ND	8/3/2020
TOTAL PCBs	MCL	0.0005	MG/L	ND	7/31/2002	ND	8/3/2020	ND	8/3/2020
TOXAPHENE	MCL	0.003	MG/L	ND	7/31/2002	ND	8/3/2020	ND	8/3/2020
ANTIMONY, TOTAL	MCL	0.006	MG/L	ND	7/31/2002	ND	7/7/2020	ND	7/7/2020
ARSENIC	MCL	0.01	MG/L	ND	7/31/2002	ND	7/7/2020	ND	7/7/2020
BARIUM	MCL	2	MG/L	0.027	7/31/2002	0.038	7/7/2020	ND	7/7/2020
BERYLLIUM, TOTAL	MCL	0.004	MG/L	ND	7/31/2002	ND	7/7/2020	ND	7/7/2020
CADMIUM	MCL	0.005	MG/L	ND	7/31/2002	ND	7/7/2020	ND	7/7/2020
CHROMIUM	MCL	0.1	MG/L	ND	7/31/2002	ND	7/7/2020	ND	7/7/2020
CYANIDE	MCL	0.2	MG/L	ND	7/31/2002	ND	7/7/2020	ND	7/7/2020
FLUORIDE	MCL	4	MG/L	1.3	7/31/2002	1.15	7/7/2020	1.49	7/7/2020
LEAD	MCL	0.015	MG/L	–	–	ND	7/7/2020	ND	7/7/2020
MERCURY	MCL	0.002	MG/L	ND	7/31/2002	ND	7/7/2020	ND	7/7/2020
NICKEL			MG/L	ND	7/31/2002	ND	7/7/2020	ND	7/7/2020
NITRATE	MCL	10	MG/L	ND	7/31/2002	0.13	7/7/2020	ND	7/7/2020
NITRATE-NITRITE			MG/L	ND	7/31/2002	0.13	7/7/2020	ND	7/7/2020
SELENIUM	MCL	0.05	MG/L	ND	7/31/2002	ND	7/7/2020	ND	7/7/2020
SODIUM			MG/L	80	7/31/2002	88.9	7/7/2020	53	7/7/2020
THALLIUM, TOTAL	MCL	0.002	MG/L	ND	7/31/2002	ND	7/7/2020	ND	7/7/2020
1,1,1-TRICHLOROETHANE	MCL, MML	0.002	MG/L	ND	7/31/2002	ND	7/7/2020	ND	7/7/2020
1,1,2-TRICHLOROETHANE	MCL	0.005	MG/L	ND	7/31/2002	ND	7/7/2020	ND	7/7/2020
1,1-DICHLOROETHYLENE	MCL, MML	0.007	MG/L	ND	7/31/2002	ND	7/7/2020	ND	7/7/2020
1,2,4-TRICHLOROBENZENE	MCL	0.07	MG/L	ND	7/31/2002	ND	7/7/2020	ND	7/7/2020
1,2-DICHLOROETHANE	MCL, MML	0.005	MG/L	ND	7/31/2002	ND	7/7/2020	ND	7/7/2020
1,2-DICHLOROPROPANE	MCL	0.005	MG/L	ND	7/31/2002	ND	7/7/2020	ND	7/7/2020
BENZENE	MCL, MML	0.005	MG/L	ND	7/31/2002	ND	7/7/2020	ND	7/7/2020
CARBON TETRACHLORIDE	MCL, MML	0.005	MG/L	ND	7/31/2002	ND	7/7/2020	ND	7/7/2020
CHLOROBENZENE	MCL	0.1	MG/L	ND	7/31/2002	ND	7/7/2020	ND	7/7/2020
CIS-1,2-DICHLOROETHYLENE	MCL	0.07	MG/L	ND	7/31/2002	ND	7/7/2020	ND	7/7/2020
DICHLOROMETHANE	MCL	0.005	MG/L	ND	7/31/2002	ND	7/7/2020	ND	7/7/2020
ETHYLBENZENE	MCL	0.7	MG/L	ND	7/31/2002	ND	7/7/2020	ND	7/7/2020
O-DICHLOROBENZENE	MCL	0.6	MG/L	ND	7/31/2002	ND	7/7/2020	ND	7/7/2020
P-DICHLOROBENZENE	MCL	0.075	MG/L	ND	7/31/2002	ND	7/7/2020	ND	7/7/2020
STYRENE	MCL	0.1	MG/L	ND	7/31/2002	ND	7/7/2020	ND	7/7/2020
TETRACHLOROETHYLENE	MCL	0.005	MG/L	ND	7/31/2002	ND	7/7/2020	ND	7/7/2020
TOLUENE	MCL	1	MG/L	ND	7/31/2002	ND	7/7/2020	ND	7/7/2020
TRANS-1,2-DICHLOROETHYLENE	MCL	0.1	MG/L	ND	7/31/2002	ND	7/7/2020	ND	7/7/2020
TRICHLOROETHYLENE	MCL, MML	0.005	MG/L	ND	7/31/2002	ND	7/7/2020	ND	7/7/2020
VINYL CHLORIDE	MCL, MML	0.002	MG/L	ND	7/31/2002	ND	7/7/2020	ND	7/7/2020
XYLENES, TOTAL	MCL	10	MG/L	ND	7/31/2002	ND	7/7/2020	ND	7/7/2020

Notes
BOLD = detected
BOLD RED = exceeds regulatory standard
ASR = aquifer storage and recovery
RWS = Regional Water System
MCL = maximum contaminant level for drinking water
mg/L = milligram per liter
MML = groundwater maximum measurable level
ND = not detected

Figure B.1: Nitrate in City of Hermiston Well No. 5 (UMAT 1771)

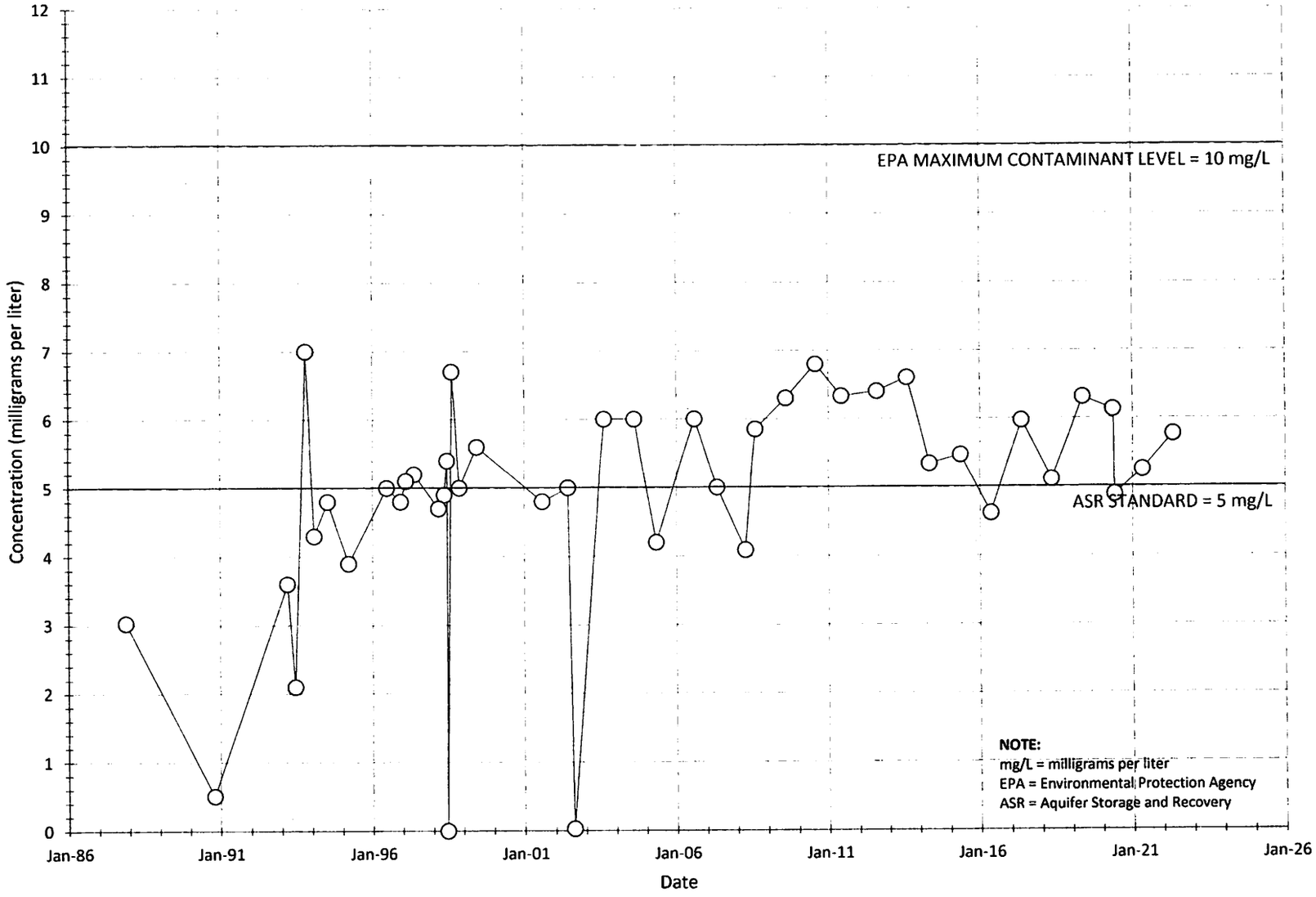


TABLE D.2

CITY OF HERMISTON, OREGON
PRELIMINARY COST ESTIMATE
ASR ALTERNATIVES EVALUATION
May 18, 2023

NO	DESCRIPTION - SOURCE RWS	UNIT	UNIT PRICE	ESTIMATED QUANTITY	TOTAL PRICE
Receiving Well No 2					
1	Piping Reconfiguration	LS	150,000	All Req'd	150,000
2	Retrofit of site with Instrumentation and Controls	LS	75,000	All Req'd	75,000
3	RWS WTP Low Head Pump and Piping Improvements	LS	400,000	All Req'd	400,000
			Total Estimated Construction Cost		**$ 625,000**
			Construction Contingencies (35%)		219,000
			Design and Construction Engineering (20%)		125,000
			TOTAL ESTIMATED PROJECT COST (2022)		**$ 969,000**
Receiving Well No 4					
1	Piping Reconfiguration	LS	150,000	All Req'd	150,000
2	Retrofit of site with Instrumentation and Controls	LS	75,000	All Req'd	75,000
3	RWS WTP Low Head Pump and Piping Improvements	LS	400,000	All Req'd	400,000
			Total Estimated Construction Cost		**$ 625,000**
			Construction Contingencies (35%)		219,000
			Design and Construction Engineering (20%)		125,000
			TOTAL ESTIMATED PROJECT COST (2022)		**$ 969,000**
Receiving Well No 6					
1	Piping Reconfiguration	LS	150,000	All Req'd	150,000
2	Retrofit of site with Instrumentation and Controls	LS	75,000	All Req'd	75,000
			Total Estimated Construction Cost		**$ 225,000**
			Construction Contingencies (35%)		79,000
			Design and Construction Engineering (20%)		45,000
			TOTAL ESTIMATED PROJECT COST (2022)		**$ 349,000**
Receiving Well New Well					
1	New Well Pump Equipment and Structure	LS	1,800,000	All Req'd	1,800,000
			Total Estimated Construction Cost		**$ 1,800,000**
			Construction Contingencies (35%)		630,000
			Design and Construction Engineering (20%)		360,000
			TOTAL ESTIMATED PROJECT COST (2022)		**$ 2,790,000**

Assumptions:

Receiving Well No. 2:

Costs include low head pump and piping improvements at RWS WTP, piping reconfiguration at the well site with instrumentation and controls.

Receiving Well No. 4:

Costs include low head pump and piping improvements at RWS WTP, piping reconfiguration at the well site with instrumentation and controls.

Receiving Well No. 6:

No change in RWS WTP pumping. Costs include piping connection to existing potable system in Kelli Blvd, piping reconfiguration at the well site with instrumentation and controls.

Receiving Well New Well:

No change in RWS WTP pumping. Costs include deep well pump equipment and structure.

Note need for new pumping equipment at any receiving well would be an additional $600,000.

TABLE D.2
CITY OF HERMISTON, OREGON
PRELIMINARY COST ESTIMATE
ASR ALTERNATIVES EVALUATION
May 18, 2023

NO.	DESCRIPTION - SOURCE WELL NO. 5	UNIT	UNIT PRICE	ESTIMATED QUANTITY	TOTAL PRICE
Receiving Well No. 2					
1	Piping Reconfiguration	LS	150,000	All Req'd	150,000
2	Retrofit of site with Instrumentation and Controls	LS	75,000	All Req'd	75,000
			Total Estimated Construction Cost		**$ 225,000**
			Construction Contingencies (35%)		79,000
			Design and Construction Engineering (20%)		45,000
			TOTAL ESTIMATED PROJECT COST (2022)		**$ 349,000**
Receiving Well No. 4					
1	Piping Reconfiguration	LS	150,000	All Req'd	150,000
2	Retrofit of site with Instrumentation and Controls	LS	75,000	All Req'd	75,000
			Total Estimated Construction Cost		**$ 225,000**
			Construction Contingencies (35%)		79,000
			Design and Construction Engineering (20%)		45,000
			TOTAL ESTIMATED PROJECT COST (2022)		**$ 349,000**
Receiving Well No. 6					
1	Piping Reconfiguration	LS	150,000	All Req'd	150,000
2	Retrofit of site with Instrumentation and Controls	LS	75,000	All Req'd	75,000
3	Replacement and Upsizing of View Drive Booster Station	LS	600,000	All Req'd	600,000
			Total Estimated Construction Cost		**$ 825,000**
			Construction Contingencies (35%)		289,000
			Design and Construction Engineering (20%)		165,000
			TOTAL ESTIMATED PROJECT COST (2022)		**$ 1,279,000**
Receiving Well New Well					
1	Upsizing of Joseph Booster Station	LS	400,000	All Req'd	400,000
2	New Well Pump Equipment and Structure	LS	1,800,000	All Req'd	1,800,000
			Total Estimated Construction Cost		**$ 2,200,000**
			Construction Contingencies (35%)		770,000
			Design and Construction Engineering (20%)		440,000
			TOTAL ESTIMATED PROJECT COST (2022)		**$ 3,410,000**

Assumptions:

Receiving Well No. 2:

No change in Well No. 5 pumping or transmission/distribution piping. Costs include piping reconfiguration at the well site with instrumentation and controls.

Receiving Well No. 4:

No change in Well No. 5 pumping or transmission/distribution piping. Costs include piping reconfiguration at the well site with instrumentation and controls.

Receiving Well No. 6:

No change in Well No. 5 pumping or transmission/distribution piping. Costs include replacement and upsizing of View Drive Booster Station, piping reconfiguration at the well site with instrumentation and controls.

Receiving Well New Well:

No change in Well No. 5 pumping or transmission/distribution piping. Costs include upsizing the Joseph Booster Station and deep well pump equipment and structure .

Note new well equipment at any of the receiving wells would be an additional $600,000.

Table D.3. Planning-Level Costs for Down-Hole Equipment
City of Hermiston ASR Alternatives Assessment

Well 2		
3R Valve, 12-inch, control located inside existing City-owned building	$	220,000
New pump and riser pipe, set at 520 feet bgs	$	160,000
Down-hole non-vented pressure transducer and cable, set at 520 feet bgs	$	3,834
Two (2) PVC drop tubes to 520 feet bgs	$	10,400
Contractor fee to install 3R valve, pump, riser, PVC drop tubes	$	34,633
Hydrogeologic Consulting Services	$	20,000
20% contingency	$	85,773
TOTAL	**$**	**534,641**
Well 4		
3R Valve, 12-inch, control located inside existing City-owned building	$	220,000
New pump and riser pipe, set at 650 feet bgs	$	170,000
Down-hole non-vented pressure transducer and cable, set at 650 feet bgs	$	4,030
Two (2) PVC drop tubes to 650 feet bgs	$	13,000
Contractor fee to install 3R valve, pump, riser, PVC drop tubes	$	34,633
Hydrogeologic Consulting Services	$	20,000
20% contingency	$	88,333
TOTAL	**$**	**549,996**
Well 6		
3R Valve, 12-inch, control located inside existing City-owned building	$	220,000
New pump and riser pipe, set at 500 feet bgs	$	155,000
Down-hole non-vented pressure transducer and cable, set at 500 feet bgs	$	3,710
Two (2) PVC drop tubes to 500 feet bgs	$	10,000
Contractor fee to install 3R valve, pump, riser, PVC drop tubes	$	34,633
Hydrogeologic Consulting Services	$	20,000
20% contingency	$	84,669
TOTAL	**$**	**528,012**
New Well		
3R Valve, 12-inch, control located inside existing City-owned building	$	220,000
New pump and riser pipe, set at 700 feet bgs	$	180,000
Down-hole non-vented pressure transducer and cable, set at 700 feet bgs	$	4,950
Two (2) PVC drop tubes to 700 feet bgs	$	14,000
Contractor fee to install 3R valve, pump, riser, PVC drop tubes	$	34,633
Hydrogeologic Consulting Services	$	468,228
20% contingency	$	90,717
TOTAL	**$**	**1,012,528**

Table D.4. Planning-Level Costs for a New ASR Well

City of Hermiston ASR Alternatives Assessment

Item No.	Description	Quantity	Unit	Unit Price	Total Price
1	Mobilization and Demobilization including all equipment and incidental items for installing and testing the production wells, including site preparation and restoration.	1	LS	$350,000	$350,000
2	Erosion Control and Water Management	1	LS	$40,000	$40,000
3	Drill 20-inch nominal diameter upper borehole and furnish, install and remove any temporary casing used.	1000	LF	$556	$555,500
4	Furnish and install 16-inch OD 0.375-inch wall low-carbon steel production casing (including 3-foot stick-up)	1003	LF	$113	$113,339
5	Furnish and install cement grout seal between 16-inch OD production casing and upper borehole	1000	LF	$94	$94,000
6	Drill minimum 14-inch nominal diameter lower borehole	400	LF	$367	$146,600
7	Furnish and install 12-inch SS liner and screen assembly (assume 315 feet of blank SS casing)	315	LF	$244	$76,860
8	Funrish and install 12-inch SS liner and wire wrap screen assembly (assume 95 feet of screen)	95	LF	$266	$25,270
9	Furnish and install cone reducer	1	LS	$25,000	$25,000
10	Well Development	8	HR	$795	$6,360
11	Conduct Plumbness Test	1	LS	$13,454	$13,454
12	Conduct Alignment Test	1	LS	$13,454	$13,454
13	Perform video inspection of full length of the well	2	LS	$4,638	$9,275
14	Furnish, install, and remove test pump system and appurtenances required to complete aquifer testing	1	LS	$50,000	$50,000
15	Perform step-rate drawdown test	8	HR	$464	$3,708
16	Perform 48-hour constant-rate drawdown test with recovery, including water level and flow monitoring during the pumping period (includes 1 hour of water level monitoring prior test and 24 hours of recovery).	73	HR	$428	$31,208
17	Well Disinfection	1	LS	$6,108	$6,108
18	Furnish and install well cap and temporary well protection	1	LS	$625	$625
Hourly Work and Standby Time					
19	Authorized Hourly Work	0	HR	$893	$0
20	Standby Time	0	HR	$768	$0
Design and Engineering (30% of total)					
	Design and Engineering	1	LS	$468,228	$468,228
BID SUBTOTAL (Includes 20% Contingency)					**$1,872,911**

LS = lump sum; LF = linear foot; HR = hour

Table D.5. Planning-Level Costs for ASR Limited License
City of Hermiston ASR Alternatives Assessment

Well 2		
Groundwater quality samples (source and receiving water) - full SDWA suite	$	11,420
PHREEQC Analysis (SSPA)	$	7,926
Aquifer test with existing pump to confirm yield & performance of ASR well (48 hour + Recovery)	$	9,646
OWRD Fees	$	1,150
Limited License Application	$	56,405
Pull pump and Well Video to assess well condition	$	93,870
20% contingency	$	*36,083*
TOTAL	**$**	**216,500**
Well 4		
Groundwater quality samples (source and receiving water) - full SDWA suite	$	11,420
PHREEQC Analysis (SSPA)	$	7,926
Aquifer test with existing pump to confirm yield & performance of ASR well (48 hour + Recovery)	$	9,646
OWRD Fees	$	1,150
Limited License Application	$	56,405
Pull pump and Well Video to assess well condition	$	93,870
20% contingency	$	*36,083*
TOTAL	**$**	**216,500**
Well 6		
Groundwater quality samples (source and receiving water) - full SDWA suite	$	11,420
PHREEQC Analysis (SSPA)	$	7,926
Aquifer test with existing pump to confirm yield & performance of ASR well (48 hour + Recovery)	$	9,646
OWRD Fees	$	1,150
Limited License Application	$	56,405
Pull pump and Well Video to assess well condition	$	93,870
20% contingency	$	*17,309*
TOTAL	**$**	**197,726**
New Well		
Groundwater quality samples (source and receiving water) - full SDWA suite	$	11,420
PHREEQC Analysis (SSPA)	$	7,926
Aquifer test with existing pump to confirm yield & performance of ASR well (48 hour + Recovery)	$	7,827
OWRD Fees	$	1,150
Limited License Application	$	56,405
Pull pump and Well Video to assess well condition	$	-
20% contingency	$	*16,946*
TOTAL	**$**	**101,674**

ASR Financing/Redundancy Plan

Customer pays $1M/yr (+5% annually) Redundant Demand Charge

- Guarantees 4,500GPM Redundant supply, but only in the event that their supply from the RWS officially gets interrupted, and they can only use this during the duration of any RWS interruption.
- Guarantees up to:
  - Year 1: 0MG
  - Year 2: 130MG available in "bank" (20 Days Redundancy)
  - Year 3: 260MG (Minus any usage beginning from Year 2) (60MG Guaranteed regardless of AWS Usage) (49 Days Redundancy)
  - Year 4: 390MG (Minus any usage beginning from Year 2) (90MG Guaranteed) (74 Days Redundancy)
  - Year 5: 520MG (Minus any usage beginning from Year 2) (120MG Guaranteed) (99 Days Redundancy)
  - Year 6: 580MG (Minus any usage beginning from Year 2) (220MG Guaranteed) (124 Days Redundancy)
  - Year 7: 580MG (Minus any usage beginning from Year 2) (380MG Guaranteed) (148 Days Redundancy)
  - Year 8: 580MG (Minus any usage beginning from Year 2) (540MG Guaranteed) (173 Days Redundancy)
  - Years 9+: 580MG (Minus any usage beginning from Year 2) (580MG Guaranteed) (179 Days total: 90 Days Guaranteed)

Table 1.2 Summary of Developed and Undeveloped Allocations (gpm)

Users	Potable		Non-potable		Total Developed	Total Undevelop
	Developed	Undeveloped	Developed	Undeveloped		
City	1,500	-	780	4,720	2,280	4,720
Port of Umatilla	-	-	-	6,500[1]	-	6,500[1]
Calpine	-	-	2,900	-	2,900	-
HGC	-	-	2,600	-	2,600	-
Simplot	-	-	2,000	-	2,000	-
Shearer's	255	245	-	-	255	245
First Oregon	-	-	-	2,600[2]	-	2,600[2]
Vadata	-	-	2,900[3]	-	2,900[3]	-
Total	1,755	245	15,878 ~~11,180~~	9,122 ~~13,820~~	12,935	14,065
	2,000		~~25,000~~			

Notes:

1. The Port of Umatilla owns 6,500 gpm of unallocated water right, available for future developmer

Phase 2 is moving 4,698 gpm
from Undeveloped to Developed

Thanks,

Mark Morgan
Assistant City Manager
(541) 567-5521
180 NE 2nd St.
Hermiston, OR 97838
Where Life is Sweet

Temporary Water Supply Agreement

- **Service:**
  - Up to 1,400GPM Potable Water for Cooling (Temporary)
  - Drinking Water (10,000 gallons per day)- Permanent
  - Domestic Sewer (toilet flushing, etc.)- Permanent
  - "Backwash" Sewer (filter cleaning 28,000 gallons per day)- Permanent

- **Supply Source:**
  - Temporary: City's 1,500GPM Potable Capacity in RWS
  - Permanent: Port of Umatilla's 6,500GPM Non-Potable Capacity

- **Term:**
  - Cooling Water- September 27, 2023 through February, 2025 (effectively just 2024CY)
  - All others- Permanent

- **Cost:**
  - Upfront Capital to city: $0
  - Upfront Capital to Customer: $3.5M

- **Water Rate:**
  - Higher of current City Rate, or RWS Potable Rate

- **Sewer Rate:**
  - Same rate as all commercial/industrial users
  - Metered Monthly (seasonal usage)

WATER AND WASTEWATER SERVICE AGREEMENT

This WATER SERVICE AGREEMENT ("**Agreement**") is entered into as of this _____ day of ____, 2023 (the "**Effective Date**") by and between the CITY OF HERMISTON, OREGON, a municipal corporation with offices at 180 NE 2nd St., Hermiston, OR 97838 (the "**City**") and AMAZON DATA SERVICES, INC., a Delaware corporation with offices at 410 Terry Avenue North, Seattle, WA 98109 ("**ADS**"). The City and ADS are each referred to as a "**Party**," and collectively as the "**Parties**."

RECITALS

A. The City owns and operates a potable water supply system comprised of water diversion, treatment, and distribution facilities that provide potable water to residents and businesses that are customers of the City ("**Potable Water System**"). The City also owns and operates a non-potable industrial water supply system comprised of water diversion, treatment, and distribution facilities that provide industrial water to industrial users that are customers of the City (the "**Regional Water System**"). Collectively, the Potable Water System and Regional Water System are referred to as the "**City Water System.**"

B. ADS is developing two new data center campuses in the City, the **PDX 138 Campus** and the **PDX 245 Campus**, the operation of which requires constant sources of potable and industrial water supply. The City desires to provide potable and industrial water to the PDX 138 and PDX 245 Campuses, and is currently undertaking improvements to the Potable Water System to deliver potable water for domestic purposes (the "**Potable Water System Improvements**") and improvements and upgrades to the Regional Water System to deliver temporary and permanent industrial cooling water to the campuses (the "**Regional Water System Improvements and Upgrades**").

C. At ADS's request, the City and ADS desire to enter into an agreement that provides for water and sanitary sewer services for the PDX 138 and PDX 245 Campuses, as described below:

a. With respect to the PDX 138 Campus: 1) the delivery from the Regional Water System of 1,400 gallons per minute ("gpm") of temporary potable cooling water at a pressure of 50 pounds per square inch ("psi") to the PDX 138 Campus by September 27, 2023; 2) the acceptance of up to 14,000 gallons per day ("gpd") of thickened backwash and domestic sanitary sewer water from the PDX 138 Campus into the City's sanitary sewer system by September 27, 2023; and 3) the delivery from the Potable Water System of 5,000 gpd of filtered potable water for domestic use by September 27, 2023. Upon the Port ofUmatilla's (the "**Port**") delivery of 1,620 gpm of permanent non-potable water capacity

at the PDX 138 Campus, ADS will abandon its continuous use of 1,400 gpm potable water connection at PDX 138, cease receiving potable water from the Regional Water System for industrial cooling needs except in the case of an emergency, and continue to receive potable water from the Potable Water System for domestic purposes only.

b. With respect to the PDX 245 Campus: 1) if the Port's delivery from the Regional Water System of 1,620 gpm of permanent non-potable industrial water at a pressure of 55 psi to the PDX 245 Campus is delayed beyond February 1, 2025, the temporary delivery from the Regional Water System of 350 gpm of filtered potable water at a pressure of 50 psi to the PDX 245 Campus by February 1, 2025, and until such non-potable industrial water is available, provided that the temporary potable cooling water capacity allocated under Recital C.a. shall be simultaneously reduced by 250 gpm (the physical connection for such temporary water will be completed by September 1, 2023); 2) the acceptance of up to 14,000 gpd of thickened backwash and domestic sanitary sewer water from the PDX 245 Campus into the City's sanitary sewer system by September 1, 2024; and 3) the delivery from the Potable Water System of 5,000 gpd of filtered potable water for domestic use by September 1, 2024. Upon- the Port's delivery of the total 1,620 gpm of non-potable water capacity at the PDX 245 Campus, ADS will abandon its continuous use of 350 gpm potable water connection at PDX 245 except in the case of an emergency, cease receiving potable water from the Regional Water System for industrial cooling needs, and continue to receive potable water from the Potable Water System for domestic purposes only.

AGREEMENT

NOW THEREFORE, for and in consideration of the mutual promises, terms and understandings contained herein, and intending to be legally bound hereby, the Parties hereto do agree as follows:

ARTICLE 1 – DEFINITIONS AND INTERPRETATION

1.1 **Definitions.** As used in this Agreement, the following terms will have the meanings set forth below:

(a) "**ADS Indemnified Party**" means ADS and its Affiliates and their respective directors, officers, employees, agents, representatives, successors, andassigns.

(b) "**Affiliate**" means any entity that directly or indirectly controls, is controlled by or is under common control with ADS, including any direct or indirect subsidiary,

parent, or sister company of ADS. For the purposes of this definition, the term "control" means the power to direct or cause the direction of the management or policies, directly or indirectly, whether through the ownership of voting securities, by contract or otherwise.

(c) "**Applicable Law**" means all laws, statutes, rules, regulations, ordinances, codes, Judgments, orders, Approvals, tariffs, decrees, and other pronouncements having the effect of law of any Governmental Authority.

(d) "**City Indemnified Party**" means the City and its officers, employees, agents, and representatives, and their respective successors and assigns.

(e) **"Cease Data Center Operations"** means any of the following has occurred:

- The water meter supplying the campus with non-potable water has not registered any flow within the previous 12 months.
- ADS has made a request to the Umatilla County Board of Property Tax Adjustment to reduce the property tax liability for the campus due to business closure.

(f) "**Damages**" means any loss, demand, claim, suit, action, assessment, damage, liability, cost, expense, fine, penalty, judgment, award or settlement, whether or not involving a Governmental Authority or third party claim, including related Fees and Costs, interest, and any amounts paid in investigation, defense or settlement of any of the foregoing. Except as specifically provided in this Agreement, "Damages" does not include, and neither Party will be liable for, any loss of profit and any other incidental, consequential, exemplary, or punitive damages, including, without limitation, lost profits, lost production or lost revenues, except to the extent such damages are awarded and actually paid to a third party.

(g) "**Fees and Costs**" means the reasonable fees and expenses of attorneys, experts, and other persons, and all court costs, fees, and related expenses incurred in connection with any arbitration, administrative, legal or equitable proceeding in any court, administrative body or arbitral forum.

(h) "**Governmental Authority**" means any national, state, provincial, local, tribal or municipal government, any political subdivision thereof or any other governmental, regulatory, quasi-governmental, judicial, public or statutory

instrumentality, authority, body, agency, department, bureau, or entity with authority to bind a Party at law

(i) "**Latecomer**" means any person who in the future receives City water supply services from the City Water System within twenty (20) years of the date the Potable Water System Improvements and (20) years of the date the Regional Water System Improvements and Upgrades were completed.

(j) "**PDX 138 Industrial Water Connection**" means the industrial water connection point located on the PDX 138 Campus at the intersection of SE Kelli Blvd. and Feedville Rd., to be designed and constructed by ADS.

(k) "**PDX 138 Potable Water Connection**" means the potable water connection point located on the PDX 138 Campus at the intersection of SE Kelli Blvd. and Feedville Rd., to be designed and constructed by ADS.

(l) "**PDX 245 Industrial Water Connection**" means the industrial water connection point located on the PDX 245 Campus at the intersection of SE Kelli Blvd. and Feedville Rd., to be designed and constructed by ADS.

(m) "**PDX 245 Potable Water Connection**" means the potable water connection point located on the PDX 245 Campus at the intersection of SE Kelli Blvd. and Feedville Rd., to be designed and constructed by ADS.

(n) "**Port Agreement**" means the water services agreement entered between ADS and the Port for the Port's supply of permanent non-potable cooling water to the PDX 138 and PDX 245 Campuses.

(o) "**Prudent Industry Practices**" means any of the practices, methods, and acts engaged in or approved by a significant portion of the water industry during the relevant time period, or any of the practices, methods, and acts which, in the exercise of reasonable judgment in light of the facts known at the time the decision was made, could have been expected to accomplish the desired result at a reasonable cost consistent with good business practices, reliability, safety, and expedition. Prudent Industry Practices is not intended to be limited to the optimum practice, method, or act, to the exclusion of all others, but rather is intended to include acceptable practices, methods, and acts generally accepted in the industry.

(p) "**Supply Chain Standards**" means the supply chain standards available at: https://sustainability.aboutamazon.com/people/supply-chain, as amended from time to time.

1.2 **Interpretation**. In this Agreement, unless the context otherwise requires, in the event of any conflict between the terms and conditions of the body of this Agreement with the terms and conditions of any Exhibit, the terms and conditions of the body of this Agreement will control.

ARTICLE 2– TERM, EFFECTIVE DATE, TERMINATION

2.1 **Term**.

(a) ***Initial Term.*** This Agreement will be in full force and effect from the Effective Date and will remain in effect for an initial term of twenty-five (25) years ("**Initial Term**").

(b) ***Renewal Terms***. At the end of the Initial Term, this Agreement will automatically renew for ten successive one (1) year terms (each a "**Renewal Term**") unless ADS provides written notice to the City at least 90 days prior to the end of the Initial Term or any Renewal Term that it does not intend to renew the Agreement.

2.2 **Termination**.

(a) **Termination by Mutual Consent**. The City and ADS may terminate this Agreement at any time by mutual written consent.

(b) **Termination by ADS**. ADS may terminate this Agreement at any time by providingwritten notice to the City at least 90 days prior to the date of such termination.

(c) **Termination by the City**. The City acknowledges the substantial investment to be made by ADS in the PDX 138 and PDX 245 Campuses, and that the operation of the PDX 138 and PDX 245 Campuses is dependent upon the delivery of water by the City. Therefore, the City will keep this Agreement in place and may not unilaterallyterminate this Agreement.

(d) **Termination from closure**. ADS Acknowledges the substantial value of the water rights that the City grants ADS via this Agreement. Therefore, after the Initial Term, the City may terminate this Agreement if both the PDX 138 or PDX 245 Campuses cease their data center operation. If only one Campus closes its data center operation, the City and ADS will amend this agreement to terminate the City's obligations with respect to the closed Campus. The City's

obligations under this Agreement with respect to the operational Campus will remain in effect and unchanged.

ARTICLE 3 – WATER AND SANITARY SEWER SERVICES

3.1 **City Obligations.**

(a) The City will design, engineer, construct, operate, and maintain the Potable Water System Improvements, sanitary sewer, and Regional Water System Improvements and Upgrades in accordance with **Exhibit 1** (Scope of Work and Cost of Phase 1 System Improvements), **Exhibit 2** (Scope of Work and Cost of Phase 2 Regional Water System Upgrades), and **Exhibit __** (Scope of Work and Cost of PDX245 Offsite Improvements), Prudent Industry Practices, and Applicable Law.

(b) Within 30 days of the Effective Date, the City will give ADS a written update on the City's progress in designing, engineering, and constructing the Potable Water System Improvements and the Regional Water System Improvements and Upgrades.

(c) As described in Exhibit 1, no later than September 27, 2023, the City will provide 1,400 gpm of temporary cooling water at a pressure of 50 psi to the PDX 138 Campus to be delivered at the PDX 138 Potable Water Connection via the Regional Water System. If the City cannot provide temporary cooling water via its Regional Water System by September 27, 2023, the City will provide ADS with an alternative source of cooling water at the City's sole costs.

(d) N o later than February 1, 2025, the Port will provide 1,620 gpm and 1.16 million gpd of industrial cooling water at a pressure of 55 psi to the PDX 138 Campus to be delivered at the PDX 138 Industrial Water Connection via the Regional Water System. If the Port cannot provide non-potable industrial water via the Regional Water System by February 1, 2025, the City will provide ADS with an alternative source of such cooling water at the City's sole costs until the Port provides such non-potable industrial water.

(e) No later than February 1, 2025, the Port will provide 1,620 gpm and 1.16 million gpd of industrial water at a pressure of 55 psi to the PDX 245 Campus to be delivered at the PDX 245 Industrial Water Connection via the Regional Water System. The City will provide a temporary delivery of 350 gpm of filtered potable water at a pressure of 50 psi to the PDX 245 Campus on Feedville Rd by August 1, 2024, until the time that the Port's non-potable water service can begin.

(f) If the Port terminates the Port Agreement, or otherwise fails to meet its water service obligations under the Port Agreement, by, or prior to, February 1, 2025, the City will step in and use its own water rights to provide the PDX 138 and PDX 245 Campuses with permanent non-potable cooling water that meets the capacity and pressure specifications set forth in the Port Agreement. The City's obligations to provide ADS with permanent non-potable cooling water under this section will be subject to the City's obligations set forth in this Agreement. The City's obligations to provide ADS with permanent non-potable cooling water will begin immediately upon the Port's failure to meet its water service obligations under the Port Agreement, or the Port's termination of the Port Agreement, by, or prior to, February 1, 2025, and will continue until the earlier of (i) the termination of this Agreement or (ii) the Parties mutually agree the City will stop providing such service. ADS will pay the City for such permanent industrial cooling water under the rates provided in Section 4.2(b).

(g) If the Port terminates the Port Agreement or otherwise fails to meet its water service obligations under the Port Agreement after February 1, 2025, and the City has water rights available, the City will step in and use its own water rights to provide the PDX 138 and PDX 245 Campuses with permanent non-potable cooling water that meets the capacity and pressure specifications set forth in the Port Agreement. The City will only be obligated to step in if the City has available un-committed fully-developed un-restricted water rights to cover some or all of the Campuses' permanent non-potable cooling water needs. The City's obligations to provide ADS with permanent non-potable cooling water under this section will be subject to the City's obligations set forth in this Agreement.

~~(g)~~(h) Beginning September 27, 2023, the City will provide 5,000 gpd of filtered potable water via the Potable Water System to the PDX 138 Campus for domestic purposes only, and not for industrial purposes, except as a backup or emergency supply, provided that the City makes no assurances as to available potable capacity for backup or emergency supply after February 1, 2025.

~~(h)~~(i) Beginning August 1, 2024, the City will provide 5,000 gpd of filtered potable water via the Potable Water System to the PDX 245 Campus for domestic purposes only, and not for industrial purposes, except as a backup or emergency supply, provided that the City makes no assurances as to available potable capacity for backup or emergency supply after August 1, 2024.

~~(i)~~(j) As described in Exhibit 1, the City will provide sanitary sewer services capable of serving up to 14,000 gpd to the PDX 138 Campus by September 27, 2023.

~~(j)~~(k) As described in Exhibit _, the City will provide sanitary sewer services capable of serving up to 14,000 gpd to the PDX 245 Campus by September 1, 2024.

~~(k)~~(l) City water service to the PDX 138 and PDX 245 Campuses is of the essence of this Agreement, and except as a result of a Force Majeure Event or as agreed to by ADS for maintenance purposes, such service will not be suspended for more than 24 hours.

3.2 **ADS Obligations**

(a) ADS will reimburse the City [$3,122,813] for costs incurred by the City to design and construct the Potable Water System Improvements, sanitary sewer, and Regional Water System Improvements and Upgrades as described in **Exhibit 1** (Scope of Work and Cost of Phase 1 System Improvements).

(b) ADS will reimburse the City [$15,818,913] for costs incurred by the City to design and construct the Regional Water System Improvements and Upgrades, and installation of generators at the Regional Water System intake and non-potable pump station #2, to provide electrical system redundancy, as described in **Exhibit 2** (Scope of Work and Cost of Phase 2 Regional Water System Upgrades).

(c) ADS will reimburse the City [$3,213,000] for costs incurred by the City to design and construct the Potable Water System Improvements, sanitary sewer, and Regional Water System Improvements and Upgrades, as described in **Exhibit 3** (Scope of Work and Cost of PDX245 Offsite Improvements).

(d) The ADS reimbursement amounts set forth in Section 3.2(a), (b), and (c) will not be increased without the prior written consent of ADS. The City will supply ADS with proof of actual costs within 30 days of the expense. ADS shall, upon receipt of request for reimbursement of costs from the City, reimburse the City for the actual costs within 30 days.

3.3 **Latecomer Connection Charge.** For twenty (20) years after the Potable Water System Improvements are completed, and for twenty (20) years after the Regional Water System Upgrades are completed, the City will collect a water connection charge from any and all Latecomers that connect to the Potable Water System Improvements or the Regional Water System Upgrades ("**Latecomer Connection Charge**") prior to allowing the Latecomer to connect. The Latecomer Connection Charge will be based on the amount of water requested by the Latecomer in

proportion to the capacity of the capacity of the Potable Water System Improvements or the Regional Water System Upgrades. For example, if the total cost of the Regional Water System Upgrades is $1 million for an added capacity of 1 cfs, and the Latecomer requests 0.1 cfs, the Latecomer Connection Charge should be $100,000. The City will pay to ADS the full amount of any and all Latecomer Connection Charges collected pursuant to this Section within thirty (30) days of receipt from the Latecomer.

3.4 **Operation, Maintenance and Repair Responsibilities**. The City will operate and maintain the City Water System and the related connections to the Potable Water System and the Regional Water System in a manner consistent with Prudent Industry Practices andin compliance with all Applicable Law.

3.5 **ADS Operation, Maintenance, and Repair Responsibilities**. ADS will be solely responsible for operation and maintenance of facilities on its properties to the extent such facilities are operated exclusively for the benefit of ADS.

ARTICLE 4 - RATES AND PAYMENTS

4.1 **Water & Sanitary Sewer Rates.**

(a) **Potable water**. Filtered, potable water shall be billed at the City of Hermiston Water Department's rate as it exists at the time of usage. The City's and ADS's obligations with respect to billing, payments, appeals, and delinquencies will be governed by Chapter 52 of the Hermiston City Code (including any amendments thereto that the City may from time-to-time duly adopt). In the event that the ~~cost for the~~rate at which the City of Hermiston's Water Department ~~to purchase~~purchases potable water from the Regional Water System exceeds the rate charged to ADS, then City ~~shall~~ will notify ADS on a monthly basis of the actual overage cost amount and will present ADS with an invoice, due within 30 days, for the actual overage cost no later than January 31 of each year.

(b) **Non-potable industrial water.** If the City steps in to provide permanent non-potable cooling water under Section 3.1(f), ADS will pay the City, as operator of the Regional Water System, for water deliveries according to the rates charged by the City to other non-potable customers of the Regional Water System, as well as any unpaid System Development Charges owed to the Regional Water System according to the adopted methodology. The City's and ADS's obligations with respect to billing, payments, appeals, and delinquencies will be governed by Chapter 52 of the

Hermiston City Code (including any amendments thereto that the City may from time-to-time duly adopt).

(c) **Sanitary Sewer.** Sanitary sewer shall be billed at the City of Hermiston Sewer Department's Industrial Discharge User rate as it exists at the time of usage. The City's and ADS's obligations with respect to billing, payments, appeals, and delinquencies will be governed by Chapter 51 of the Hermiston City Code (including any amendments thereto that the City may from time-to-time duly adopt).

4.2 **Rate Discrimination Prohibited.** In the event that the City modifies its rate structure to establish different customer classes or proposes to adopt any other change in rates or charges that do not apply equally to all classes of customers, any such rates and charges will be fairly and reasonably allocated to each customer class in relation to the cost of the City of providing water service to such customer class.

4.3 **Measurement of Water Quantity.** The City will install, own, and maintain a water meter that meets all applicable accuracy, precision, and calibration standards established by all Applicable Laws. The City will operate, maintain, test, and calibrate the water meter, as necessary, pursuant to Prudent Industry Practices and Applicable Law. The City will meter the amount of water service delivered to ADS facilities within fifteen (15) days following the end of each calendar month. City charges for water service deliveries will be based on the flow rate of the City's adopted rate structure.

4.4 **Water Meter Calibration and Inspection.** The City will provide ADS with reasonable notice of meter test and calibration dates, provide ADS with access to observe such testing and calibration, and provide ADS certified results of tests and calibrations within 30 days after completion. If, as a result of any test, the water meter is found to be registering outside the applicable accuracy standard, the City will promptly restore the water meter to the applicable accuracy standard, or replace the meter with one that meets such accuracy standard. The City will correct all inaccurate readings for up to a maximum correction period of 12 months and adjust monthly invoices as necessary to incorporate the accurate data.

ARTICLE 5 – FORCE MAJEURE EVENT

5.1 **Definition.** A Party will not be responsible for any delay or failure to perform to the extent that the delay or failure to perform is caused by an event or circumstance that (a) is beyond the reasonable control of such Party, (b) was not foreseeable at the time of execution of this Agreement, or if foreseeable, could not have been avoided or overcome by such Party through the exercise of commercially reasonable diligence, and (c) prevents, hinders or delays such Party in its

performance of any (or any part) of its obligations under this Agreement (each, a "**Force Majeure Event**"). Subject to the requirements of the prior sentence, Force Majeure Events may include acts of God, sudden actions of the elements such as floods, earthquakes, hurricanes, or tornadoes; high winds, lightning, ice storms or other weather event or physical natural disaster of a strength or duration that is not normally encountered in the area of the Project; fire; sabotage; vandalism; terrorism; war; cyber-attacks; invasion; hostilities; rebellion; revolution; requisition, expropriation or compulsory acquisition by any governmental or competent authority; riots; explosion; blockades; insurrection; employment strike against a third-party; slow down or labor disruptions (even if such difficulties could be resolved by conceding to the demands of a labor group); or interruptions to transportation.

Under no circumstances will the following events constitute a Force Majeure Event: (i) any acts or omissions of any third party under the control or direction of a Party, including, without limitation, any vendor, customer, or supplier of the Party claiming a Force Majeure Event, unless such acts or omissions themselves result from underlying Force Majeure Events; (ii) changes in economic or market conditions that affect the costs or benefits of a Party's performance or availability of funds to make payments due; (iii) equipment defects; or (iv) any delay in providing, or cancellation of, any approvals by the issuing Governmental Authority unless resulting from an underlying Force Majeure Event.

5.2 **Notice and Mitigation**. The Party affected by a Force Majeure Event will promptly notify the other Party in writing of such event, giving details of the Force Majeure Event, its anticipated effect on the affected Party's performance under this Agreement, and the steps that the affected Party is taking to remedy the delay. Upon the occurrence of a Force Majeure Event, the affected Party will, as promptly as practicable, use all reasonable efforts to eliminate the cause of such Force Majeure Event, reduce costs, and resume performance under this Agreement. Upon cessation of a Force Majeure Event, the affected Party will provide prompt written notice to the other Party.

ARTICLE 6 – INDEMNIFICATION

Indemnification by the City. To the extent allowed and limited by the Oregon Constitution and the Oregon Tort Claims Act, the City will indemnify, defend, and hold harmless the ADS Indemnified Parties from and against all third party claims, demands, and legal proceedings and all resulting Damages, arising or resulting from: (1) the negligence or willful conduct of the City or any of its officers, employees, agents, representatives, or contractors in connection with performance of the City's obligations under this Agreement; (2) any violation of Applicable Law arising from the activities of the City or any of theCity's officers, employees, agents, representatives, or contractors in connection with performance of the City's obligations

under this Agreement; (3) the failure by the City to fulfill any of its obligations under this Agreement; ***except that*** the ADS Indemnified Parties will not be indemnified hereunder to the extent that such Damages arise or result from the gross negligence or willful misconduct of any ADS Indemnified Party or the unexcused breach by ADS of any of its obligations under this Agreement.

ARTICLE 7 – REPRESENTATIONS, WARRANTIES AND COVENANTS

7.1 **ADS Representations and Warranties.** ADS represents and warrants that:

(a) ADS is a corporation duly organized, validly existing and in good standing under the laws of the State of Delaware, with all requisite power and authority to enter into and performits obligations under this Agreement.

(b) This Agreement has been duly authorized, executed, and delivered by all necessary action of ADS and constitutes a legal, valid, and binding obligation of ADS, subject to general equity principles, enforceable against ADS in accordance with its terms, except as the same may be limited by bankruptcy, insolvency, reorganization or other similar laws affecting the rights of creditors generally.

(c) Neither the execution nor delivery by ADS of this Agreement, nor the performance by ADS of its obligations in connection with the transactions contemplated hereby or the fulfillment by ADS of the terms or conditions hereof: (i) conflicts with, violates, or results in a breach of any Applicable Law; or (ii) conflicts with, violates, or results in the breach of any term or condition of any order, judgment, or decree, or any contract, agreement, or instrument, to which ADS is a party or by which ADS or any of its properties or assets are bound, or constitutes a default under any of the foregoing.

(d) There is no action, lawsuit, claim, demand or proceeding pending before any court, arbitrator, private alternative dispute resolution system, or Governmental Authority, or, to the best of ADS's knowledge, threatened, the outcome of which, if determined in a manner adverse to ADS, could reasonably be expected to have a material adverse effect on the execution and delivery of this Agreement or any other agreement or instrument entered into by ADS in connection with the transactions contemplated hereby, the validity, legality, or enforceability of this Agreement, or any other agreement or instrument entered into by ADS in connection with the transactions contemplated hereby, or which would adversely affect the ability of ADS to perform its obligations hereunder or under any such other agreement or instrument.

7.2 **City Representations and Warranties.** The City represents and warrants that:

(a) The City is a municipal corporation duly organized, validly existing and in good standing under the laws of the State of Oregon, with its principal office and place of business at the location set forth in **Section 9.1**, with all requisite power and authority to enter into and perform its obligations under this Agreement.

(b) This Agreement has been duly authorized, executed, and delivered by all necessary action of the City and constitutes a legal, valid, and binding obligation of the City, subject to general equity principles, enforceable against the City in accordance with its terms, except as the same may be limited by bankruptcy, insolvency, reorganization, or other similar laws affecting the rights of creditors generally.

(c) Neither the execution nor delivery by the City of this Agreement, nor the performance by the City of its obligations in connection with the transactions contemplated hereby or the fulfillment by the City of the terms or conditions hereof: (i) conflicts with, violates, or results in a breach of any Applicable Law; or (ii) conflicts with, violates, or results in the breach of any term or condition of any order, judgment, or decree, or any contract, agreement,or instrument, to which the City is a party or by which the City or any of its properties or assets are bound, or constitutes a default under any of the foregoing.

(d) There is no action, lawsuit, claim, demand, or proceeding pending before any court, arbitrator, private alternative dispute resolution system, or Governmental Authority, or, to the best of the City's knowledge, threatened, the outcome of which, if determined in a manner adverse to the City, could reasonably be expected to have a material adverse effect on the execution and delivery of this Agreement or any other agreement or instrument entered into by the City in connection with the transactions contemplated hereby, the validity, legality, or enforceability of this Agreement, or any other agreement or instrument entered into by the City in connection with the transactions contemplated hereby, or which would adversely affect the ability of the City to perform its obligations hereunder or under any such other agreement or instrument.

7.3 **Supply Chain Standards.** To the extent applicable to the City's activities in connection with the Agreement, the City will, and will cause its Affiliates to, comply with the Supply Chain Standards. If any updates made to the Supply Chain Standards after the Effective Date are unacceptable to the City (acting reasonably and in accordance with Prudent Industry Practices), the City may provide written notice to ADS of the same, including a full explanation. Following the City's receipt of such notice, the Parties will work together in good faith to agree to any exceptions from the updates to the Supply Chain Standards.

7.4 **Confidential Information.** The Parties' disclosures and activities in connection with this Agreement and the Project are subject to the Non-Disclosure Agreement signed by the Parties dated May 21, 2014 ("NDA"). If the NDA expires or is terminated during the Term and is not renewed or replaced, the terms of such prior NDA will continue to apply to the Parties' activities in connection with this Agreement and the Project until a new NDA is executed by the Parties.

7.5 **Public Announcements.** The City will not issue, or allow a third party or Affiliate to issue, any public announcement, press release or public statement, or conduct press tours, regarding this Agreement without ADS's prior written consent, not to be unreasonably withheld. Subject to the NDA, ADS may issue public announcements, press releases, and statements related to this Agreement in its sole discretion. The City may disclose information to third parties if such information has already been publicly disclosed by ADS, and the City is directly asked to provide such information by the third party.

ARTICLE 8 – DEFAULT AND REMEDIES

8.1 **Events of Default**. Any of the following actions or inactions by a Party will constitute an "**Event of Default**" if such Party (the "**Defaulting Party**"):

(a) **Breach of Representations.** Makes a representation or warranty that is false or misleading when made to such an extent that it prevents the Party from performing its commitments under this Agreement.

(b) **Breach of Obligations.** Fails to perform any of its material obligations or covenants under this Agreement, which failure continues for 30 days after written notice from the other Party ("**Non-Defaulting Party**").

(c) **Reorganization or Insolvency**. (i) Becomes insolvent or is unable to pay its debts or fails (or admits in writing its inability) generally to pay its debts as they becomes due; (ii) makes a general assignment, arrangement, or composition with or for the benefit of its creditors; (iii) has instituted against it a proceeding seeking a judgment of insolvency or bankruptcy or any other relief under any bankruptcy or insolvency law or other similar law affecting creditor's rights, or a petition is presented for its winding-up or liquidation, which proceeding is not dismissed, stayed, or vacated within 30 days thereafter; (iv) commences a voluntary proceeding seeking a judgment of insolvency or bankruptcy or any other relief under any bankruptcy or insolvency law or other similar law affecting creditors' rights; (v) seeks or consents to the appointment of an administrator, provisional liquidator, conservator, receiver, trustee, custodian, or other similar official for it or for all or substantially all of its assets; (vi) has a secured party take

possession of all or substantially all of its assets, or has a distress, execution, attachment, sequestration, or other legal process levied, enforced, or sued on or against all or substantially all of its assets; (vii) causes or is subject to any event with respect to it which, under the applicable law of any jurisdiction, has an analogous effect to any of the events specified in clauses (i) to (vi) inclusive; or (viii) takes any action in furtherance of, or indicating its consent to, approval of, or acquiescence in, any of the foregoing acts.

8.2 **Remedies for Event of Default.** Upon the occurrence of an Event of Default and notice to the Defaulting Party, the Non-Defaulting Party may:

(a) Suspend performance of its obligations under this Agreement; and

(b) Receive from the Defaulting Party direct Damages incurred by the Non-Defaulting Party in connection with such Event of Default.

8.3 **Limitation of Damages.** Damages payable under this Agreement will be limited to direct Damages. In no event will ADS be liable for Damages in excess of five million dollars ($5,000,000). Neither Party will be liable for any indirect, special, consequential, incidental, exemplary, or punitive Damages including, without limitation, lost profits, lost production, or lost revenues, arising out of this Agreement, except to the extent resulting from a Party's indemnification obligations under this Agreement.

8.4 **No Waiver**. A Party's failure at any time or times to require strict performance by the other Party of any provision of this Agreement will not waive, affect, or diminish any right of such Party thereafter to demand strict compliance and performance herewith or therewith. Any suspension or waiver of an Event of Default will not suspend, waive, or affect any other Event of Default whether the same is prior or subsequent thereto and whether the same or of a different type. No waiver is effective unless signed in a non-electronic form by the waiving Party.

ARTICLE 9 – MISCELLANEOUS

9.1 **Notices**

(a) **Methods and Addresses**. All notices, demands, requests, or other communications required by this Agreement must be in writing and given as follows by: (i) established overnight commercial courier with delivery charges prepaid or duly charged; (ii) electronic mail; or (iii) certified mail, return receipt requested, postage prepaid. All notices must be addressed to the applicable addresses set forth below.

If to ADS:

Amazon Data Services, Inc.
410 Terry Avenue North
Seattle, WA 98109
Fax: 206-266-7010
Email: Infraenergy@amazon.com

With a copy to:

410 Terry Avenue North Seattle, WA
98109-5210 U.S.A.
Attention: General Counsel (AWS)
contracts-legal@amazon.com, infraenergy@amazon.com
Attention: General Counsel (AWS)

If to the City:

City of Hermiston
Attn: Byron Smith
City Manager
180 NE 2nd St.,
Hermiston, OR 97838
Fax: 541-567-5530
Email: bsmith@hermiston.or.us

With a copy to:
*By U.S. Mail and email*Rich
Rich Tovey
City Attorney
180 NE 2nd St.
Hermiston, OR
97838
Email: rtovey@hermiston.or.us

(b) **Notices Given**. Notices will be deemed "given": (i) when sent by electronic mail; (ii) when accepted by overnight commercial courier; or (iii) when deposited into the United States Postal Service.

9.2 **Severability**. If any court of competent jurisdiction or applicable Governmental Authority finds any part of this Agreement invalid or unenforceable, then that part is deemed modified to the extent necessary to render it valid and enforceable. If it cannot be so saved, it will be severed, and the remaining parts will remain in full force and effect.

9.3 **Assignment**. Except as provided in this Section 9.3, neither Party may assign this Agreement without the other Party's prior written consent, which will not be unreasonably withheld. ADS may assign this Agreement to an Affiliate of ADS without the City's consent.

9.4 **Binding Effect and Benefit**. This Agreement will be binding upon and inure to the benefit of the Parties, their successors and their permitted assigns.

9.5 **Entire Agreement**. This Agreement represents the entire agreement between and among the Parties with respect to the subject matter hereof, and supersedes all prior agreements, understandings and commitments, whether oral or written, with respect thereto.

9.6 **Amendment**. This Agreement may be amended only by a written instrument signed by the Parties.

9.7 **Governing Law and Venue**. This Agreement will be governed by and interpreted in accordance with the laws of the State of Oregon, excluding its conflicts of law provisions. Disputes under or related to this Agreement will be resolved in the state or federal courts in the State of Oregon.

9.8 **Waiver of Jury Trial.** Each Party waives, to the fullest extent permitted by Applicable Law, any right it may have to a trial by jury in respect of any dispute arising out of or relating to this Agreement.

9.9 **Survival.** Sections 3.1, 4, 6, 7.4, 8.3, 9.7, and 9.8 will survive expiration or termination of this Agreement.

9.10 **No Third-Party Beneficiaries.** Nothing in this Agreement will provide any benefit to any third-party or entitle any third-party to any claim, cause of action, remedy, or right of any kind.

9.11 **Relationship of Parties.** The Parties are independent contractors, and nothing in this Agreement creates an employer-employee relationship, a partnership, joint venture, or other relationship between the Parties. Neither Party has authority to assume or create obligations of any kind on the other's behalf.

9.12 **Entire Agreement; Counterparts**. This Agreement, together with all incorporated exhibits and schedules and the NDA, constitute the complete and final agreement of the Parties pertaining to the respective subject matter and supersede the Parties' prior related agreements, understandings, and discussions. Each Party will accept electronic signatures for the execution of this Agreement and execution may be conducted in counterparts, each of which

(including signature pages) is an original, but all of which together is one and the same instrument.

[SIGNATURE PAGE ON NEXT PAGE]

IN WITNESS WHEREOF, and intending to be legally bound, the duly authorized representatives of the Parties have caused this Agreement to be executed as of the date first written above:

CITY OF HERMISTON

By: _____
Byron Smith, City Manager

ATTEST:

_____
, City Recorder

APPROVED AS TO FORM:

_____
Rich Tovey, City Attorney

AMAZON DATA SERVICES, INC.

By: _____
Nat Sahlstrom
Vice President