

**AGENDA BILL**  
**Beaverton City Council**  
**Beaverton, Oregon**

**SUBJECT:** Bid Award – Aquifer Storage and Recovery (ASR) Pump Station No. 5 Well Drilling Project

**FOR AGENDA OF:** 4-05-16 **BILL NO:** 16081

**Mayor's Approval:** RMS

**DEPARTMENT OF ORIGIN:** PW J. J. C.

**DATE SUBMITTED:** 3-28-16

**CLEARANCES:**

City Attorney	<u>W. P. K.</u>
CAO	<u>RMS</u>
Purchasing	<u>J. J. C.</u>
Finance	<u>J. J. C.</u>
Public Works	<u>J. J. C.</u>
Engineering	<u>J. J. C.</u>

**PROCEEDING:** CONSENT AGENDA  
(CONTRACT REVIEW BOARD)

- EXHIBITS:**
1. Siting Tech Memo
  2. Proposed Well Location
  3. Bid Results Summary

**BUDGET IMPACT**

EXPENDITURE	AMOUNT	APPROPRIATION
REQUIRED \$972,457	BUDGETED \$1,488,391*	REQUIRED \$0

\* Account Numbers 505-75-3621-682 and 683 – Water Construction Fund – ASR Number 5 Project – Construction Account and Design and Engineering Account. \$1,488,391 is the remaining amount in the FY 2015-16 Adopted Budget for this project.

**RECOMMENDED ACTION:**

City Council, acting as the Contract Review Board, authorizes the Mayor to sign a contract with Holt Services, Inc., of Puyallup, Washington for the Aquifer Storage and Recovery (ASR) No. 5 Well Drilling Project (CIP 4021D) in a form approved by the City Attorney.

**HISTORICAL PERSPECTIVE:**

The ASR No. 5 project has been anticipated for some time as a replacement for ASR No. 1. Council previously authorized the Mayor to sign a contract with the State of Oregon, Infrastructure Finance Authority (IFA) for the ASR No. 5 project during the March 17, 2015, Council Meeting (Agenda Bill No. 15060, not attached), and also an amendment to this contract during the December 1, 2015, Council Meeting (Agenda Bill No. 15236, not attached).

**INFORMATION FOR CONSIDERATION:**

During the preliminary engineering (PE) phase of the project, a siting analysis (Exhibit 1) was performed to determine the preferred location to drill the new ASR No. 5 well hole. The analysis considered the following five evaluation criteria:

1. Minimize hydraulic interference/conflicts with existing ASR wells.
2. Minimize conflicts with existing site piping and utilities.
3. Minimize impacts to trees and other vegetation

4. Maximize access and future operations and maintenance activities.
5. Minimize potential visual and noise impacts to neighbors.

The final analysis recommends locating the well just north of the existing Sorrento Pump Station (Exhibit 2). This location will require seismic upgrades and reconstruction of the existing Sorrento Pump Station during the next construction phase of the project, but will help minimize the visual and noise impacts to neighbors by providing additional setback/separation from the adjacent property line.

Drilling of the proposed production well, anticipated to be approximately 16 to 20-inches in diameter, and approximately 500 to 1,000 feet deep from the ground surface, is estimated to take five months to complete. Additional project work includes converting the existing ASR No. 1 Well to a monitoring well. City staff continue to coordinate with property owners directly abutting the project, and plan to issue a well drilling construction notice to local residents and the Highland Neighborhood Association once a contractor is on board.

The invitation to bid was advertised in the Daily Journal of Commerce on March 2, 2016. Bid opening was at 2:00 P.M. on March 23, 2016, and the City received a two bids (Exhibit 3). In reviewing bid proposals, neither bidder was able to meet the required contract completion time of 160 calendar days (Holt Services proposed 177 calendar days, and Schneider Water Services proposed 261 days). However, Holt Services is the lowest responsive bidder that can complete the work in the shortest duration. Staff recommends award to Holt Services, Inc. of Puyallup, Washington, for \$972,457.

City staff is scheduled to advertise the next phase of the project, final design, in April 2016, and anticipates seeking Council award to a design consultant at a June 2016 Council meeting. Data obtained during the drilling process feeds into the final design and will help determine the size of the well pump and future well house/pump station dimensions.

# Technical Memorandum

Date: February 10, 2015  
Project: City of Beaverton ASR 5 Preliminary Engineering: Well Siting  
To: Brion Barnett, PE  
From: Ronan Igloria, PE; Bryan Black, PE

---

Subject: Well Location and Site Layout Alternatives Analysis – FINAL

---

## 1.0 Introduction

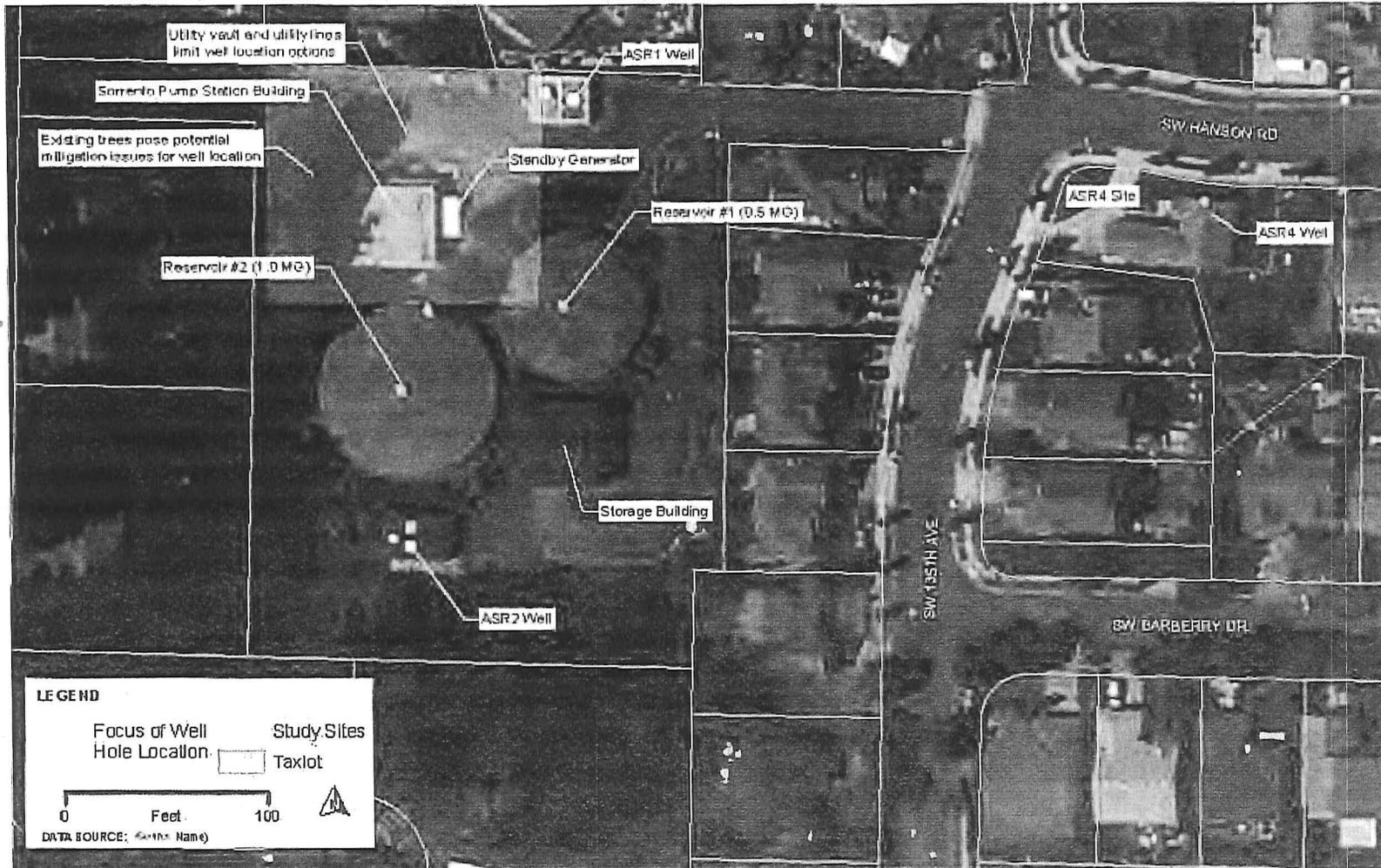
The City of Beaverton (City) is evaluating alternatives for installation of a new aquifer storage and recovery (ASR) well (ASR 5) at the Sorrento Water Facility site (Sorrento site). HDR Engineering, Inc. (HDR) was contracted to conduct an alternatives analysis for the City to select a preferred well location for ASR 5. HDR was assisted by the City's hydrogeology consultant GSI Water Solutions, Inc. (GSI). To evaluate the well locations, HDR was tasked with developing possible site layouts associated with the well location alternatives. This memorandum documents the well location alternatives, evaluation process, and the selected well location. The City will request contractor bids for drilling the well after the well location is identified.

Three existing ASR wells (ASR 1, ASR 2, and ASR 4) are located in and around the Sorrento Water Facility site. The City currently operates ASR 2 and ASR 4. ASR1 reached the end of its useful life in 2012 and is out of service. The ASR wells provide water at a peak capacity of 5 million gallons per day (mgd). The City has been planning to expand its ASR capacity with a new well, and formally prepared the ASR Expansion Report (GSI, 2014). The report recommended that the City first invest in replacing the lost capacity from ASR 1 with a new ASR 5 well at the Sorrento site.

The City submitted an application for, and was formally awarded a State Revolving Fund loan in January 2015 to install ASR 5 well and pump station to replace the lost capacity of ASR 1, and to convert ASR 1 to a monitoring well. Subsequently, in the fall of 2015, the City applied and received approval from the Oregon Infrastructure Finance Authority (IFA) to increase its loan amount to allow the City to address constraints at the Sorrento site, and to address seismic upgrades and other potential reconstruction of existing structures.

## 2.0 Existing Conditions

The Sorrento site, located west of SW Hanson Road, is a critical facility in the City's water system. As shown in Figure 1, the Sorrento site includes ASR 1 and ASR 2 wells, a booster pump station, two reservoirs, a storage building, and a significant amount of yard piping and other utilities that connect the facility to the overall water system.



EXISTING FEATURES AT THE SORRENTO WATER FACILITY

## Sorrento Water Facility Components

Combined pumping capacity of ASR well Nos. 2 and 4 is 5 mgd. ASR 2 has an estimated capacity of approximately 1,400 gallons per minute (gpm), while ASR 4 has an estimated capacity of approximately 2,100 gpm. From ASR 2, 700 gpm is available to the 525-foot pressure zone, and 700 gpm is available to the 410-foot pressure zone. ASR Pump Stations 2 and 4 also have the ability to pump into the 525-foot pressure zone.

**Table 1. Summary of Existing ASR Facilities**

ASR Number	Estimated Capacity (gpm)	Pressure Zone(s) Supplied	Status
ASR No. 1	700 (formerly)	410 (formerly)	Out of service
ASR No. 2	1,400	410/525	Operational
ASR No. 4	2,100	410/525	Operational

The Sorrento site contains two hopper-bottom style, reinforced concrete reservoir structures. Reservoir No. 1 has a capacity of approximately 0.5 million gallons (MG) and an overflow elevation of approximately 365 feet. Reservoir No. 2 has a capacity of approximately 1.0 MG and an overflow elevation of approximately 373 feet. The City currently uses Sorrento Reservoir No. 1 as pump-to-waste storage for the Sorrento ASR wells 1, 2, and 4, and is disconnected hydraulically from the City's distribution system. Reservoir No. 2 remains part of the water system and is available for potable water storage.

The Sorrento Pump Station houses two 25-horsepower (hp) single-stage centrifugal pumps with variable frequency drive (VFD) motor control. Each pump has an approximate operating range of 100 to 1,200 gpm with total capacity of 2,000 gpm. The continuous operation pump station provides water to customers in the 525-foot pressure zone on Sexton Mountain, and runs as needed to maintain a hydraulic grade line (HGL) in the zone of approximately 500 to 525 feet. Pump station suction piping is connected to the City's Joint Water Commission (JWC) supply main. If required, the pump station can also be supplied from the 410-foot pressure zone.

## 3.0 Well Location Alternatives

The key hydrogeologic issue considered in the evaluation is how the location of the new well at the Sorrento Site would affect the drawdown of groundwater levels while the other ASR wells are operating. Generally, the closer two production wells are located to each other, the greater the "interference" between the wells, i.e. the additive drawdown of groundwater levels as the wells are pumped. Because ASR 2 and ASR 4 are both located in and around the Sorrento Water Facility, the City and consulting team came to a consensus that the new ASR 5 well should be located as far away from the existing ASR wells as feasible to reduce potential hydraulic interference between the wells. With ASR 2 located on the south side of the site, and

ASR 4 located to the east of the site, the City and consulting team limited the possible locations of the new ASR 5 well to be on the northwest portion of the site near the vicinity of the existing pump station building as shown in Figure 2.

City staff and HDR conducted a workshop to define alternative well locations. The consulting team initially limited potential specific locations of the wells to the “undeveloped” areas in the northwest quadrant of the Sorrento site, i.e. areas where no existing infrastructure or utilities currently existed. However, City operations staff suggested the possibility of locating the well at the same location as the existing Reservoir No. 1 to allow more distance from the north and west property lines, and to minimize potential impacts to neighbors. The four ASR 5 well locations formally identified for evaluation are shown in Figure 2, and listed below:

- Alternative 1: Well location to the west of the existing Sorrento PS Building with a separate ASR 5 Facility Building.
- Alternative 2: Well location to the west of the existing Sorrento PS Building with a combined ASR 5 Facility Building (note: well location is the same as Alternative 1).
- Alternative 3: Well location to the north of the existing Sorrento PS Building with a combined ASR 5 Facility Building; assumes the existing PS Building walls are removed to allow more efficient use of space and integration of existing piping.
- Alternative 4: Well location at Reservoir No. 1 with a separate ASR 5 Facility Building.



ASR 5 WELL LOCATION ALTERNATIVES

## 4.0 Evaluation Criteria

During the kick-off meeting on June 30, 2015, HDR and City staff developed evaluation criteria for selecting the preferred ASR 5 well location. The evaluation criteria are listed in Table 2. Because the alternative well locations are relatively close to each other in the northwest quadrant of the site, the evaluation applies the criteria in a largely qualitative manner. With the exception of the criteria to “minimize hydraulic interference” and “minimize conflicts with existing utilities” the evaluation relied on input and feedback from City operations staff and neighbor/property owners.

**Table 2. Evaluation Criteria for Selecting Preferred Location of ASR 5 Well**

Evaluation Criterion	Description
1. Minimize hydraulic interference	Hydraulic interference reduces the reliability of peaking ASR 2, ASR 4 and ASR 5 at full capacity. Modeling conducted by GSI is used to quantify the relative impacts. The modeling results were used to eliminate Alternative 4 from further consideration.
2. Minimize conflicts with existing piping, utility lines, and other site features	The Sorrento site is a key water facility for the City where many water and sewer utilities and other infrastructure come through the northwest quadrant. Issues include access for drilling the well; and more critically, constraints on building footprint associated with the ASR facility.
3. Minimize impacts to trees and other vegetation.	The northwest quadrant of the site has several mature trees that would be impacted (removed) to drill the well or to construct the associated pump station facility. In particular, existing property owner to the west may have concerns with removal of mature trees because of visual and privacy impacts.
4. Maximize access and space for operations and maintenance (O&M) activities	In addition to access needs to operate the existing ASR facilities, Sorrento site is a critical facility for the City, and is currently used by operations staff for Supervisory Control and Data Acquisition (SCADA), storage, and meetings. Maintaining access and space with the new ASR 5 facility and equipment is important.
5. Minimize potential visual and noise impacts to neighbors	A neighborhood meeting was conducted on August 27, 2015 as an opportunity to receive input on potential visual and noise concerns. Materials used for the meeting are included in Attachment C.

## 5.0 Hydraulic Interference Assessment

Because the Alternative 4 well location is closer to the existing ASR 2 and ASR 4 wells than the other alternatives, the City tasked GSI under separate contract to evaluate potential issues with this location from a hydraulic interference perspective. GSI conducted groundwater modeling to evaluate the potential drawdown at ASR 2, ASR 4, and ASR 5 under Alternative 4.

The groundwater model was run under a peaking scenario (3 days with all wells on at full capacity of 7 mgd, then off for a week, starting the first of July). The individual pumping rates were based on the following input from City staff:

- Non-peaking scenario: ASR 2 at 2 mgd, ASR 4 at 2 mgd, and ASR 5 at 0 mgd.

- Peaking scenario: ASR 2 at 2 mgd, ASR 4 at 2 mgd, and ASR 5 at 3 mgd.

Based on the analysis, GSI provided the following results:

- With ASR 5 at the Alternative 1 and 2 locations using the peaking scenario, the model yields approximately 1 foot of additional drawdown at ASR 2 and ASR 4.
- With ASR 5 at the Alternative 4 location using the peaking scenario, the model yields approximately 3 feet of additional drawdown at ASR 2 and ASR 4, and slightly less than 1 foot of additional drawdown in ASR 5 relative to Alternatives 1 and 2.

Based on these results, GSI provided the following conclusions and recommendations:

- Although the 3 feet of additional drawdown at ASR 2 and 4 is relatively minor, it does represent approximately 10 percent of additional drawdown relative to ASR 5 being located in the northwest corner of the property.
- Three (3) feet of additional drawdown at ASR 4 may affect the ability to maintain 2 mgd during peaking events where drawdown will approach, and potentially exceed, the pump shut off level at ASR 4.

Given the already thin margin of available drawdown predicted during 7 mgd peaking events, the minor amount of additional drawdown that could be produced by locating ASR 5 at the Alternative 4 location will decrease the reliability of peaking at full capacity, particularly for peaking events later in the pumping season. Therefore, barring a significant incentive for locating ASR 5 near the Alternative 4 location, GSI recommends eliminating Alternative 4 from further consideration. Attachment A includes the analysis documentation provided by GSI.

## **6.0 Evaluation of Alternatives**

Based on the hydraulic interference findings provided by GSI, the City decided to move forward with evaluating Alternatives 1, 2, and 3. Because Alternatives 1 and 2 have the same well-hole location, the difference between the two alternatives is whether to build the ASR 5 pump station facility separate from (Alternative 1) or combined with (Alternative 2) the existing Sorrento PS Building. Alternative 3 has the well location to the north of the existing Sorrento PS Building, with the ASR pump station facility integrated with the existing Sorrento PS Building. As noted in Section 3.0, Alternative 3 assumes the existing PS Building is largely removed to allow more efficient use of space and integration of existing piping.

### **6.1 Input from Land Use and Building Pre-application Meeting**

City of Beaverton Engineering Division conducted a pre-application conference on July 22, 2015 with the City's Community Development Department-Planning Division. The materials provided as part of the pre-conference meeting are included in Attachment B. As part of the pre-application conference process, the Building Services Division and Tualatin Valley Fire and

Rescue (TVF&R) also reviewed information provided by the City Engineering Division in the pre-application conference application<sup>1</sup>.

The pre-conference meeting concluded that the project calls for a Type 3 conditional use application process, which requires a Neighborhood Review Meeting through the Highland Neighborhood Advisory Committee. Regardless of the alternatives, the project would result in a major modification of a conditional use, requiring a Design Review 2 or 3. The Planning Division also recommended further agency review with Clean Water Services.

One key item that came up during the meeting was the question of impact to the existing trees. The City's Planning Division staff commented that removal of any of the trees could be an issue for neighbors (regardless of whether the trees are on city property or not). Details from the pre-application feedback are presented in Attachment B in the Pre-Application Summary Notes provided by Scott Whyte, City of Beaverton Planning Division (dated August 14, 2015).

## 6.2 Input from Neighborhood Meeting

City staff organized the neighborhood meeting with the Highland Neighborhood Association Committee for August 27, 2015, as required by the land-use application process. Attachment C includes materials provided by the City at the meeting. This includes an ASR 5 Fact Sheet and posters showing building and preliminary site layout concepts for Alternatives 1 and 2. Alternative 2 is very close in building size and function as Alternative 3, and both the general orientation and layout in terms of the Alternative 2 combined building are similar to Alternative 3. Attachment D shows the building footprint and site layout for all three alternatives for comparison. The public meeting resulted in over forty attendees, based on an informal count during the event by City staff, with strong support for a combined structure.

## 6.3 Conceptual Site Layout and Building Footprints

To evaluate the well location alternatives against the criteria, HDR prepared conceptual building footprints that would reasonably house the required equipment and desired features discussed with City operations staff. The building footprints for Alternatives 1 and 2 used in the Neighborhood meeting did not change significantly. The building footprint also accounted for the requirements and input provided by City of Beaverton Planning Division and Building Division as part of the pre-application conference (see Section 6.1).

HDR applied engineering design experience to size the building footprint for each alternative. The building and assumed internal room dimensions are comparable to existing ASR facilities in the area, including City of Beaverton's ASR 4 facility and Tualatin Valley Water District's ASR facilities on Grabhorn Road and Gassner Road. As summarized in Table 3, the building footprint accounts for the following: well pump and associated piping room; chemical room for disinfection and fluoride feed equipment; chemical storage room; electrical equipment; general storage room; and conference room.

The following is a list of differing features of the layouts for the alternatives:

---

<sup>1</sup> TVF&R did not have any comments on the ASR 5 proposal pre-application materials.



- For Alternative 1, the storage room and conference room are assumed to remain in the existing PS Building since the space is already used for those purposes.
- For the combined building (Alternatives 2 and 3), the existing Sorrento PS Building incorporates some of the space needed for the listed rooms and equipment. The overall building footprint for Alternative 3 is slightly smaller than Alternative 2, because HDR assumes the existing PS Building walls and rooms would be removed, which allows better integration of piping and layout of internal rooms.
- Footprint to house the permanent on-site back-up generator is assumed to occupy the same general area as the existing mobile generator on site, i.e. to the east of the existing PS Building.

The conceptual building footprint and well location alternatives are shown in Attachment D. Because the building footprint areas are based on conceptual assumptions, the City will need to determine final room sizes, orientation, and layout during the design phase.

**Table 3. Rooms and Equipment Included in Conceptual Building Footprint**

Room/Equipment	Alternative 1		Alternative 2	Alternative 3
	New Building	Existing Building	Combined Building	Combined Building
Well pump and piping	X		X	X
Chemical equipment (fluoride, disinfection)	X		X	X
Chemical storage	X		X	X
Electrical equipment	X		X	X
General storage		X	X	X
Conference room		X	X	X
Back-up generator (separate covered room) <sup>1</sup>		X	X	X
Approximate Footprint Area (square feet)	1,950	1,620	2,720 <sup>2</sup>	2,560 <sup>2</sup>

<sup>1</sup> Area for the generator room is approximately 650 square feet for all alternatives.

<sup>2</sup> Area does not include the equivalent footprint area of the existing building of 1,620 square feet.

## 6.4 Evaluation Summary

Table 4 summarizes evaluation of the alternatives using the criteria described in Section 4.0. HDR applied relevant information from the City Engineering and Operations staff, and information from the pre-application meeting and neighborhood meeting to evaluate the alternatives against the criteria. The major disadvantage of Alternatives 1 and 2 compared to Alternative 3 are the impacts to the trees to the west of the existing PS Building. Installation of the well would require at least some of the existing trees to be removed with Alternatives 1 and 2. For Alternative 1, the new building would require removal of additional trees.



**Table 4. Evaluation of Well Location Alternatives**

Evaluation Criterion	Alternative 1	Alternative 2	Alternative 3
	(Well west of building; separate PS Building)	(Well west of building; combined PS Building)	(Well north of building; combined PS Building)
1. Minimize interference	+ Yields least hydraulic interference ASR 2 and ASR 4 wells	+ Yields least hydraulic interference ASR 2 and ASR 4 wells	+ Yields least hydraulic interference ASR 2 and ASR 4 wells
2. Minimize conflicts with existing piping, utility lines, and other site features	+ Well and new building largely avoids any utilities on the site	+ Well and combined building largely avoids any utilities on the site	- Combined building requires moving existing utility vault to allow more space for building footprint
3. Minimize impacts to trees and other vegetation.	- Requires removal of mature tree during well drilling; requires addition removal of trees for separate building footprint	0 Requires removal of mature tree during well drilling; avoids other trees for combined building footprint	+ Avoids removal of any trees during drilling and construction of combined building
4. Maximize access and space for O&M activities	- Smallest amount of additional square footage relative to other alternatives	0 Additional square footage provided in the combined building to house the wellhead	+ Greater additional square footage provided in the combined building to house the wellhead
5. Minimize potential visual and noise impacts to neighbors	- Well (and pump) is adjacent to property owner to the west	- Well (and pump) is adjacent to property owner to the west	+ Location of well inside building footprint allows more opportunity for noise mitigation
<b>Relative Score (Sum)</b>	<b>-1</b>	<b>+1</b>	<b>+3</b>

## 7.0 Conclusions

HDR recommends Alternative 3 based on the evaluation against the adopted criteria. The primary advantage of Alternatives 1 and 2 is that it is furthest from ASR 2 and ASR 4 in terms of minimizing hydraulic interference. However, drilling access to the west of the building is constrained by the trees. The City would need to remove several trees to drill the hole, and would require additional tree removal for the building. Alternatives 1 and 2 have the well location to the west of the building, which is significantly closer to the property owner to the west. This



may pose potential issues from a noise and visual mitigation perspective compared to Alternative 3.

While it is anticipated that Alternative 3 will be higher cost than either Alternative 1 or 2, the City considers the Sorrento site a critical facility, and is willing to make the investment to upgrade and expand the existing Sorrento PS Building. If cost is not a significant constraint, Alternative 3 provides considerably greater benefits than Alternatives 1 and 2, in terms of improving the City's overall resiliency.

## 8.0 Attachments

Attachment A. Hydraulic Interference Analysis

Attachment B. Pre-application Materials (conducted July 22, 2015)

Attachment C. Neighbor Meeting Materials (conducted August 27, 2015)

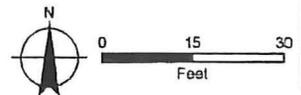
Attachment D. Building Footprint and Well Location for Alternatives



- LEGEND**
- ⊙ Proposed Drill Site
  - x - Fence
  - ▭ Tax Lot

**FIGURE 1**  
**ASR 5 Well Location**  
**Beaverton, Oregon**

**MAP NOTES:**  
 Date: February 24, 2016  
 Data Source: METRO, Air photo taken Summer 2014 by METRO



City of Beaverton

**BID SUMMARY**

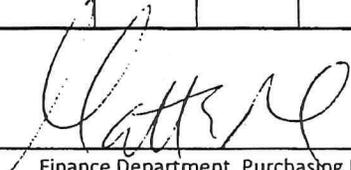
Project Name: ASR NO.5 WELL DRILLING PROJECT 3074-16B

OPENED ON: 2:00 PM on March 23, 2016

WITNESSED BY: Floyd Harrington  
Matthew Rawls

VENDOR NAME CITY, STATE	Bid Proposal	Bid Proposal Certification /Ack. Addenda	Bid Bonds	Bidder Construction Schedule	Supplemental Questions - specific to ASR 5	Bidders Responsibility Form	TOTAL BID
Holt Services Puyallup, WA	✓	✓	✓	✓	✓	✓	Total Bid Cost: \$972,457.00 Alternate 1: \$186,595.00 Alternate 2: \$379,790.00
Schneider Water Services Saint Paul, OR	✓	✓	✓	✓	✓	✓	Total Bid Cost: \$1,494,708.00 Alternate 1: \$285,906.00 Alternate 2: \$492,268.00

The Purchasing process has been confirmed.

Signed:   
Finance Department, Purchasing Division

The above amounts have been checked:  YES  NO

Date: 3/23/2016

