

## John Bell

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**From:** Steven Romero <stevenromero@me.com>  
**Sent:** Thursday, April 16, 2026 7:29 PM  
**To:** John Bell  
**Cc:** Rick Gray; Kevin Berry; Beth Cole  
**Subject:** Re: Request for Agenda Placement – Oysterville Water Follow-up  
**Attachments:** TM - Romero Oysterville Source Alternatives Analysis.pdf

Dear Commissioners,

Ahead of our meeting on Monday, April 20, we wanted to share an updated version of the Oysterville Source Alternatives Analysis prepared by Gray & Osborne.

This version reflects refinements made following recent discussions and provides a more detailed view of the alternatives considered, including the intertie option. We hope it offers helpful context in advance of our conversation.

We look forward to meeting with you on April 20 and appreciate your time and consideration.

Respectfully,

Steven Romero  
Co-President  
Oysterville Water Company

Kevin Berry  
Co-President  
Oysterville Water Company

On Feb 28, 2026, at 2:48 PM, Steven Romero <stevenromero@me.com> wrote:

Dear Commissioners,

In 2024, representatives of Oysterville Water met with North Beach Water District to discuss the long-term sustainability of our system and the potential for an intertie. At that time, North Beach stated:

“We are supportive of Oysterville looking into this and considering an intertie if that’s determined to be the best option going forward. Of course, any significant resources necessary from NBWD (office or field) in assisting in the process would need to be compensated. If it were determined that an inter-

tie is the best option, we'd want to poll the ratepayers within NBWD to measure their support before making any commitments.”

We appreciated that clarity.

With support from the Washington State Department of Health, Gray & Osborne has now completed a Technical Memorandum evaluating three alternatives:

- Improvements to the existing well and treatment system
- Development of a deeper replacement well
- Interconnection with a neighboring public system

The preliminary engineering evaluation identifies interconnection with a larger public system as the most reliable long-term option, provided capital costs can be addressed through grant funding.

We respectfully request placement on an upcoming North Beach Board agenda to summarize the study's findings and discuss whether continued exploration of a grant-supported intertie warrants further evaluation.

We understand and respect the conditions you previously outlined regarding compensation for staff resources and ratepayer input. Our goal is to determine whether a cooperative path forward merits continued discussion.

We appreciate your consideration and look forward to continuing the conversation.

Respectfully,  
Steven Romero  
Co-President  
Oysterville Water Company

Kevin Berry  
Co-President  
Oysterville Water Company

<TM - Oysterville Source Alternatives Analysis-1.pdf>



## TECHNICAL MEMORANDUM

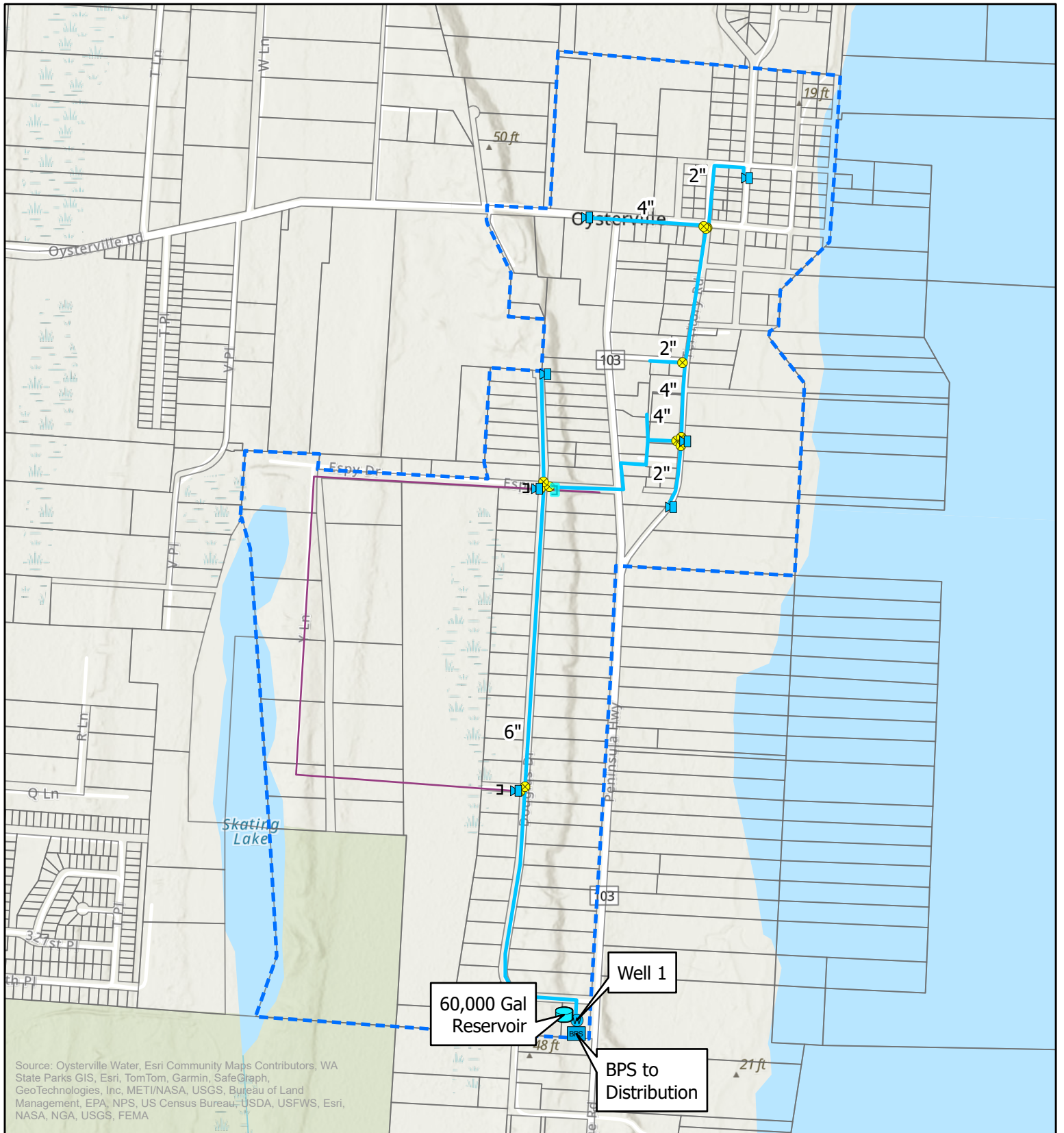
TO: STEVE ROMERO, PRESIDENT  
FROM: MIKE JOHNSON, P.E.  
MAYA VITA, E.I.T.  
DATE: APRIL 6, 2026  
SUBJECT: OYSTERVILLE SOURCE ALTERNATIVES  
ANALYSIS  
WASHINGTON STATE DEPARTMENT OF  
HEALTH, PACIFIC COUNTY,  
WASHINGTON  
G&O #25401.05

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### BACKGROUND AND PURPOSE

The Oysterville Water System (Oysterville) currently serves 76 connections in the Oysterville community on the east side of the Long Beach Peninsula. The system is supplied by a single well source that has experienced issues with iron and manganese, iron bacteria, and disinfection by-products (DBPs). Oysterville would like to evaluate water source alternatives, including improving its existing source and treatment facilities, developing a new deeper well, or connecting to a neighboring water system. Gray & Osborne has been contracted by the Washington State Department of Health (DOH) under their Technical Assistance Program, to assist Oysterville with this evaluation. This memorandum will discuss and evaluate alternatives to address the current water quality and supply issues.

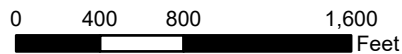
The Oysterville facilities consist of one well, a treatment system, a 60,000-gallon water storage tank, and booster pumps. An ion exchange system is used to treat the iron and manganese in the water. The system currently disinfects the well water by injecting a sodium hypochlorite solution after the ion exchange filters and maintains a minimum residual of 0.6 milligrams per liter (mg/L). The treated water is then stored in the reservoir and is pumped into the distribution system as needed. Figure 1 shows the Oysterville Water facilities and Figure 2 shows a schematic of the treatment system. Although the ion exchange process removes a large portion of the iron and manganese present in the raw water, treatment data and customer observation indicate that there may still be occasional spikes and aesthetic issues in the finished water. Table 1 summarizes the iron and manganese levels found during routine and investigative testing done by Oysterville in recent years. Results above the maximum contaminant level (MCL) are indicated in bold.



Source: Oysterville Water, Esri Community Maps Contributors, WA State Parks GIS, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, Bureau of Land Management, EPA, NPS, US Census Bureau, USDA, USFWS, Esri, NASA, NGA, USGS, FEMA

**Legend**

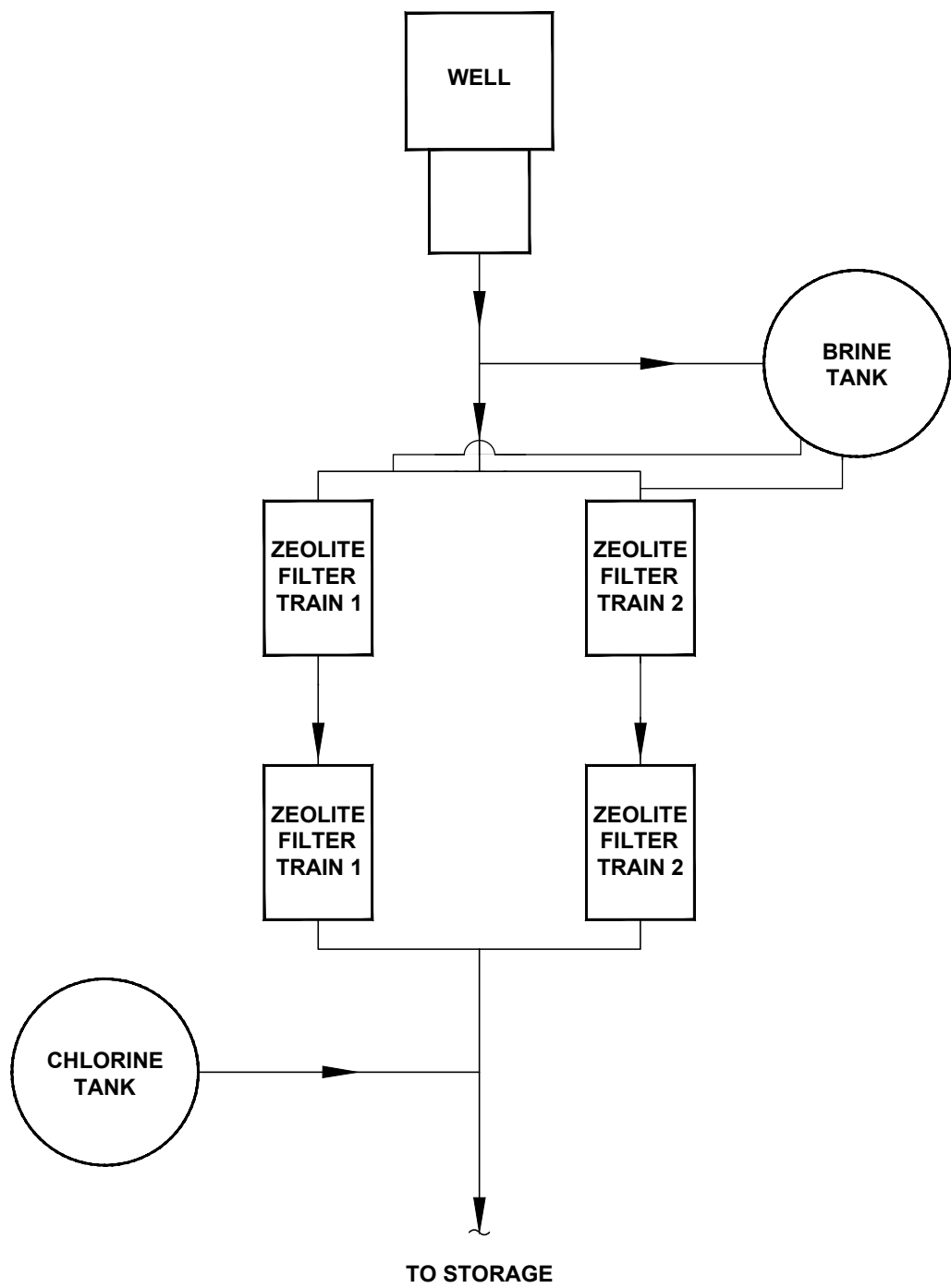
- Water Service Area
- Parcels
- Facilities**
- Well
- Blowoff Assembly
- Cap
- Gate Valve
- Abandoned Line
- PVC Water Main
- Reservoir
- BPS Pump



**OYSTERVILLE**  
 SOURCE ALTERNATIVES ANALYSIS  
**FIGURE 1**  
 EXISTING UTILITES

**Gray & Osborne, Inc.**  
 CONSULTING ENGINEERS

M:\WS\DR\25401.00\ON-CALL TECHNICAL ASSISTANCE\25401.06 OYSTERVILLE SOURCE ASSESSMENT\OYSTERVILLE FIGURES\TREATMENT SCHEMATIC FIGURE.DWG



**OYSTERVILLE WATER SYSTEM**

FIGURE 2  
OYSTERVILLE WATER TREATMENT  
SCHEMATIC



**Gray & Osborne, Inc.**  
CONSULTING ENGINEERS



**TABLE 1**

**Iron and Manganese Concentrations**

Date	Raw Iron (mg/L)	Finished Iron (mg/L)	Iron MCL (mg/L)	Raw Manganese (mg/L)	Finished Manganese (mg/L)	Manganese MCL (mg/L)
October 1, 2019	-	0.27 <sup>(1)</sup>	0.3	-	Non-detected <sup>(1)</sup>	0.05
October 21, 2021	8.18	-		0.23	-	
January 5, 2021	2.25	<b>0.71</b>		-	-	
December 2, 2021	12.8	<b>3.31</b>		0.24	0.0059	
October 26, 2022	-	-		-	<b>0.085<sup>(1)</sup></b>	
June 28, 2023	2.58	<b>0.94</b>		-	-	
July 26, 2023	2.53	<b>0.55</b>		0.136	-	
August 23, 2023	2.24	<b>0.73</b>		0.138	<b>0.073</b>	
December 20, 2023	-	-		0.121	<b>0.066</b>	
March 27, 2024	-	-		0.107	<b>0.96</b>	
September 30, 2025	-	-		-	0.044 <sup>(1)</sup>	

(1) Water quality testing found on Sentry. All other test results are from Oysterville records.

In addition to these iron and manganese events, the system has experienced periodic fouling and clogging of its well and filter system due to the ongoing presence of iron bacteria. This has also led to notable reduction in source capacity. Iron bacteria feed on iron in water and soil, producing rust-colored filaments and undesirable odors. To prevent these issues and the overgrowth of the bacteria, the Operator cleans and shock-chlorinates the well, ion exchange filters, and plumbing at least once every 6 months. Prior to the current ion exchange system, a chlorine residual of 1 mg/L was required to suppress the development of the iron bacteria. Disinfection by-products (DBPs) were higher in past years due to this higher chlorine residual. However, the system switched to CR-200, a Zeolite media, for ion exchange in 2021. This switch allowed for a lower chlorine residual and the system has not exceeded any DBP MCLs since the switch. Water sampling data from the last several years indicate that trihalomethanes (THMs) are typically 30 to 40 micrograms per liter (ug/L), and Haloacetic Acids (five) (HAA5) levels are about 15 to 25 ug/L (approximately half of their respective MCLs).

Gray & Osborne staff visited the Oysterville well site in July of 2025 to meet with the Operator, April Garcia, and discuss the current operation and maintenance of the system.



## **ALTERNATIVES EVALUATION**

Oysterville would like to evaluate the following alternatives to improve its water source capacity and quality.

1. Improve the existing well and treatment facilities.
2. Develop a deeper well.
3. Connect to a neighboring water system.

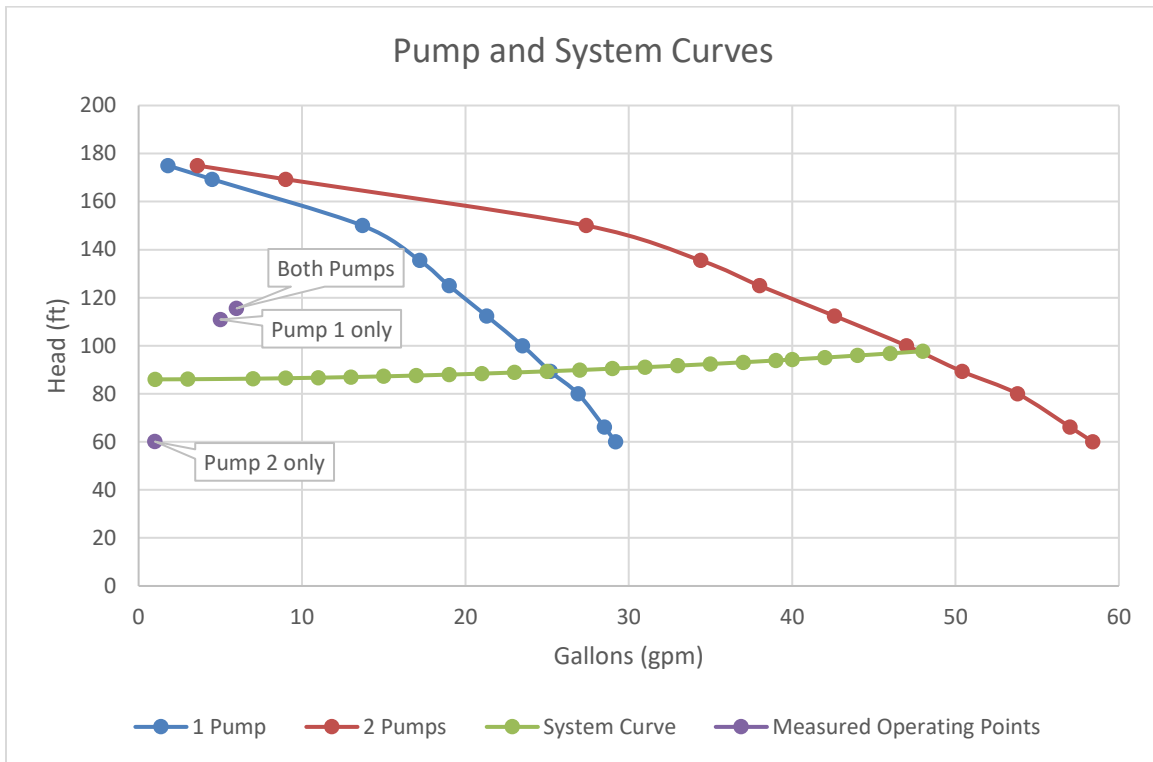
The following sections describe and evaluate these alternatives. All cost estimates include contingency and engineering/administration, and are included in Appendix A.

### **Alternative 1 – Improve Facilities**

The first alternative would be to keep the existing well in operation and improve the treatment facilities and operational practices with the goal of increasing the efficacy of iron and manganese removal, thereby reducing iron bacteria issues and increasing source capacity. At this time, the system struggles to provide adequate supply during times of high or sustained demand, particularly in the summer months.

The existing well is drilled to a depth of 87 feet and is screened from 69 feet below ground surface (BGS) to 79 feet BGS. The well has two identical pumps, Pump 1 and Pump 2, which are Berkeley models B20P4MS07231 and installed at depths of 57 and 62 feet, respectively. They operate in a lead-lag configuration, and often run concurrently during the summer to meet demand. The design flow rate for these pumps is 20 gallons per minute (gpm) each at 120 feet of head, for a total capacity of 40 gpm. At the time of the site visit, production was approximately 6 gpm with both pumps running. The Operator reported that this is a typical rate of production for the system, but that it has been higher in the past, particularly when the filter medium was initially replaced with Zeolite, and generally following deep cleaning. When production is noticeably reduced, the Operator will clean the filters with chlorine. Iron bacteria do not appear to be a significant issue downstream of the filters, suggesting current efforts are sufficient to remove active bacteria from the water at this rate of production.

In October 2025, the Operator took pressure readings in the wellhouse at the request of Gray & Osborne. These readings were taken with both pumps running and with each pump individually. These measurements are visualized in Figure 3, along with the pump and system curves, assuming a 15-psi head loss across the filters.



**FIGURE 3**

### **Pump and System Curves**

When the pumps and other system components are functioning as expected, the pumps should be operating at or near the intersection of the pump and system curves (25 gpm at 90 feet for one pump and 48 gpm at 96 feet with two pumps). As can be seen in Figure 3, both pumps are pumping much less water than would be expected. This indicates that there is likely an issue with the pumps or with the pump discharge piping. Additionally, Pump 2 seems to be more impacted than Pump 1. The observed head loss across the filters (26 psi to 5 psi) was also notably higher than the 15 psi noted in the manufacturer’s literature indicated on the Project Approval Application from when Oysterville installed the Zeolite media.

Based on these observations, it is likely that the reduced source production is due to a combination of issues with the well pumps, piping, and fouling in the filters. There are a few possibilities for system modifications to reduce these issues and to increase production.



Technical Memorandum – Oysterville Source Alternatives Analysis  
April 6, 2026

In March 2026, Oysterville replaced the well pumps and they are now producing 20 gpm with one pump running, and 25 gpm when both pumps are running. It would also be ideal to also address the apparent elevated head loss across the filters. This may be able to be improved by taking apart the filter system, removing the media, and cleaning and disinfecting all components. If this is not successful, replacement of the filter media or replacement of the filter system with an oxidation/filtration system with a manganese oxide filter media may be necessary.

There are also operational changes that may reduce the production issues. One option is to move chlorine injection before the filters. The goal of this would be to control iron bacteria before the filters to reduce fouling occurring in the filters. Increasing the chlorine contact time may increase DBP formation; however, since current DBP levels are relatively low currently, they may remain below the MCL even if they increase. To mitigate DPB formation following the filters, a spray bar system could be installed inside the water reservoir. Spray aeration is known to be effective in removing volatile contaminants such as THMs by agitating the water, causing them to evaporate. A fan could also be added to the reservoir to move air across the headspace in the reservoir to facilitate DBP removal.

Additionally, there are two places where the system uses untreated water, the brine solution that is used to regenerate the Zeolite, and the backwash. The filters are backwashed daily. The brine solution can be chlorinated manually. Oysterville has been considering system modifications that will allow backwash to use treated water instead, as the CR-200 media is engineered to be tolerant of chlorination. This could reduce bacteria in the filters as treated water is less likely to reintroduce active iron bacteria to the filter vessels. Introducing chlorine to the filters during backwash could also increase inactivation of bacteria introduced during normal operations.

The estimated cost to replace the well pumps and switch treatment to manganese oxide is \$481,000.

### **Alternative 2 – Develop Alternate Well Source**

The second alternative would be to drill a new, deeper well and hopefully obtain a more reliable source with better water quality. Two primary aquifers have been identified in previous hydrogeologic studies of the area, one shallow, unconfined aquifer near the ground surface, and a deeper aquifer of sand and gravel. The two are separated by a low-permeability clay layer and are not completely hydraulically isolated.

Aspect Consulting, LLC (Aspect) was contracted to analyze well logs and past hydrogeologic documentation of the area and prepare a technical memorandum summarizing their findings. The full report from Aspect is included in Appendix B. This



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report proposes that there are likely several areas on the Peninsula between 200 and 500 feet below mean sea level (MSL) that could yield groundwater supplies sufficient to replace the existing well. However, there are water quality concerns with drilling a well into the deeper aquifer. The report indicated that, near Oysterville's existing well, saltwater may be present between 240 feet below MSL in the summer and 400 feet below MSL in the winter. Additionally, a well drilled to 210 feet below MSL may still be affected by brackish conditions, if only seasonally. Seawater intrusion is a major water quality concern as even a small amount can significantly raise the salinity of freshwater, making it unsuitable for drinking or irrigation. Additionally, the Surfside Homeowner's Association (Surfside) wells that were drilled into the deep aquifer have similar water quality issues to Oysterville's existing well (organics, iron, and manganese).

From a water rights standpoint, Aspect suggests that there is likely legal water available on the Peninsula and obtaining a water right for a new well or transferring the existing water right would likely be possible. It was determined that "transferring an existing water right to a new well requires demonstrating that the current and proposed points of withdrawal are completed in the same body of groundwater." Since the aquifers are not entirely hydraulically separated, it is likely that the two aquifers would not be considered unique bodies of groundwater from a regulatory standpoint. It is also unlikely that a new well in that area would impair other users' access to water.

Taking Aspect's analysis into account, if Oysterville were to drill a new well on the existing site, it would have to be approximately 200 feet deep in order to both avoid saltwater concerns and draw from the deeper aquifer. Based on other wells in the area at that depth, there is a reasonable high likelihood that a deeper well would have the similar water quality issues as the existing well; however, a new well drilled carefully with steam-cleaned and disinfected tools may not have the same iron bacteria issues as the existing well.

The estimated cost to design and drill an 8-inch well approximately 200 feet to the deeper aquifer is \$512,000. If an adequate quantity and quality of water were found, equipping and treating the new well is estimated to cost approximately \$170,000 for a total project cost of \$682,000.

### **Alternative 3 – Connect to a Nearby System**

The third alternative would be to connect to a nearby system, abandon the well, and purchase water from the nearby system. There are two nearby water systems that Oysterville could potentially connect to, North Beach Water District (NBWD) and Surfside. Although raw water quality is similar, the systems have established treatment systems that should reliably improve the treated water quality.



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Alternative 3a – Connection to Surfside

Surfside is a privately-owned water system serving the properties within the Homeowners Association (HOA). It is located directly to the west of Oysterville, on the opposite side of the Peninsula. The two communities are separated by wetland areas and are connected by Oysterville Road. Due to an agreement between the two systems, Oysterville is authorized to pump 40 gpm of water under Surfside’s water right, Permit G2-24260P. This is Oysterville’s only water right.

The most feasible way for Oysterville to connect to the Surfside water system would be to install approximately 6,000 feet of water main along Oysterville Road from Sandridge Road to I Street, as shown in Figure 4. Routing the water main along Oysterville Road would avoid going through the wetlands, which may or may not be feasible due to permitting and environmental review issues. Assuming a pipe diameter of 6 inches, the estimated project cost to design and construct this pipeline is approximately \$2,615,000.

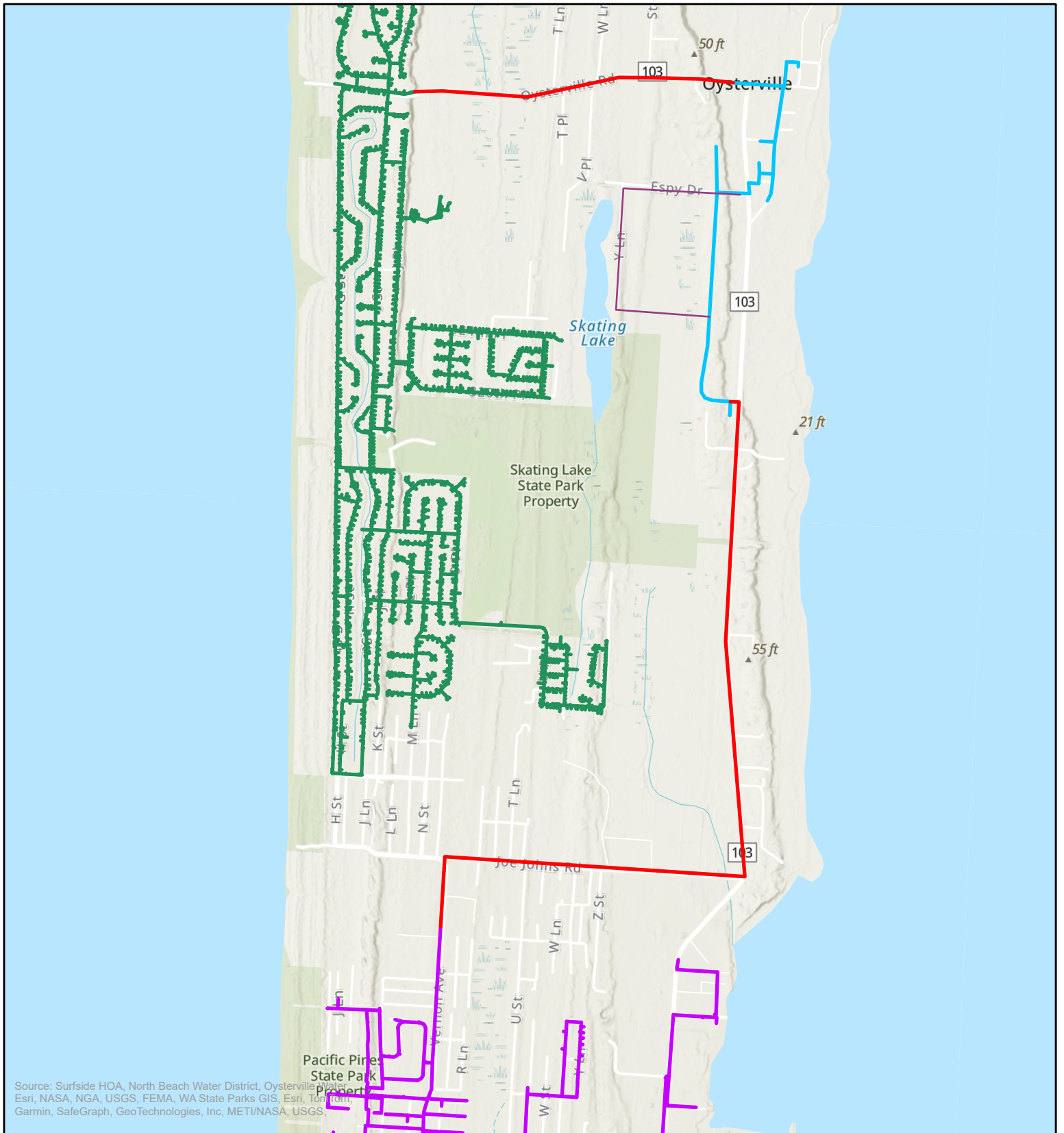
Other associated costs may include Surfside’s development fee. The development fee is \$1,200 and is charged to new services in order to fund additional water sources and distribution required to supply increased demand. Assuming the development fee is charged for each Oysterville service connection, the total cost of the development fees would be \$91,400. Actual fees may be negotiable.

When contacted by the Oysterville board, Surfside did not seem interested in serving the Oysterville system. As a privately-owned water system, they do not have any obligation to serve other systems and their bylaws may need to be changed if they were to serve outside of their HOA boundaries.

Alternative 3b – Connection to North Beach

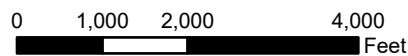
NBWD is a public water district currently serving Ocean Park, which is the area north of the City of Long Beach and south of Surfside. It is located to the south of Oysterville. The closest point of NBWD to Oysterville is located on Peninsula Highway near 277<sup>th</sup> Lane, about 2 miles south of Oysterville.

The most feasible way for Oysterville to connect to NBWD would be to install approximately 12,300 feet of water main along Peninsula Highway to tie in near the Oysterville reservoir site, as shown on Figure 4. This routing would be necessary to avoid the wetlands present throughout the peninsula. To meet NBWD standards, the connection would be 8 inches and include fire hydrants. The estimated project cost would be about \$5,505,000.



**Legend**

- North Beach Water Main
- Surfside Water Main
- Oysterville Water Main
- Existing Water Main
- Abandoned Line
- Proposed Connections



**OYSTERVILLE**

SOURCE ALTERNATIVES ANALYSIS

**FIGURE 4**

**PROPOSED CONNECTIONS**





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Additionally, Oysterville's existing facilities would need to be upgraded to meet NBWD's standards. This would include upsizing most of the system piping to 8-inch and replacing all customer service meters. The estimated project cost to replace all of Oysterville's water main and customer meters is roughly \$3,774,000. This would bring the full construction and engineering cost of consolidating with NBWD to \$9,279,000.

Other associated project costs may include a wholesale development fee, or possibly new hookup fees if NBWD takes over management of Oysterville. The wholesale development fee for a 6-inch connection is \$80,000. If NBWD charges per-connection for hookup fees instead of the flat wholesale rate, the cost to connect Oysterville's services would be \$217,750. Actual fees may be negotiable.

#### Additional Considerations

The DOH encourages small water systems consolidate with larger systems because consolidation typically provides the smaller system with more resources and therefore, a better chance to succeed as a utility provider. To incentivize this, the DOH provides some consolidation-specific funding, which will be discussed at the end of this technical memorandum.

As previously mentioned, Surfside has demonstrated reluctance to connecting, as a privately-owned system has no responsibility or obligation to provide for Oysterville aside from their shared water right. However, as a public water district, North Beach may be more feasible to connect to, or consolidate with Oysterville.

Oysterville may or may not be expected to contribute to future system improvements if it connects to either Surfside or North Beach. Based on consumption data from the three systems, Oysterville would add approximately 60 equivalent residential units (ERUs) to Surfside or North Beach. Based on their respective Water System Plans, both systems have adequate capacity to support Oysterville in the short-term. In the long-term, it is expected that both systems will require additional storage capacity within the next 10 to 15 years without Oysterville's demand. If Oysterville connects or consolidates with one of these systems, additional storage may be required sooner.

#### **EVALUTION**

Estimated costs for each alternative are summarized in Table 2. Improving the existing well and treatment system has the lowest capital cost, followed by drilling and equipping a new well. Connecting to another system has the highest capital cost with connection to NBWD being substantially more costly than connecting to Surfside.



**TABLE 2**  
**Estimated Project Costs**

Alternative Number	Alternative	Estimated Cost
1	Improve Well and Treatment Facilities	\$481,000
2	Develop Deeper Well	\$682,000
3a	Connect to Surfside	\$2,615,000
3b	Connect to North Beach	\$9,279,000

There a number of non-cost factors that should also be considered in this evaluation. The non-cost factors include the following.

- Water quality.
- Short-term risk. The possibility that issues arise during initial project phases or shortly after startup; feasibility or logistical issues.
- Long-term risk. The possibility that issues may arise in the long-term, such as water quality deterioration.
- Operational complexity. The amount of effort Oysterville will have to allocate to the operation and maintenance of the treatment facilities when the project is complete.

To incorporate these non-cost factors in the evaluation, a weighted decision matrix has been developed and is shown in Table 3. Factors were rated relative to a total weight of 100. Factors were then rated from 1 to 10, with 10 being best. For alternatives 3a and 3b, it has been assumed that the respective systems would take over ownership and management of the Oysterville Water.

**TABLE 3**  
**Source Alternative Decision Matrix**

Factor	Factor Weighting	Improve Well and Treatment Facilities		Develop Deeper Well		Connect to Surfside		Connect to North Beach	
		Rating	Weighted Rating	Rating	Weighted Rating	Rating	Weighted Rating	Rating	Weighted Rating
Capital Cost	35	10	350	7	245	2	70	1	35
Operational Complexity	15	4	60	6	90	10	150	10	150
Short-Term Risk	15	4	60	2	30	5	75	9	135



**TABLE 3 – (continued)**

**Source Alternative Decision Matrix**

Factor	Factor Weighting	Improve Well and Treatment Facilities		Develop Deeper Well		Connect to Surfside		Connect to North Beach	
		Rating	Weighted Rating	Rating	Weighted Rating	Rating	Weighted Rating	Rating	Weighted Rating
Long-Term Risk	25	4	100	5	125	9	225	9	225
Water Quality	10	3	30	5	50	7	70	7	70
Total Score	100	-	<b>600</b>	-	<b>540</b>	-	<b>590</b>	-	<b>615</b>

Using the criteria and rating methodology in Table 3, “Connect to North Beach” and “Improve Well and Treatment Facilities” are the two highest-rated alternatives. While connecting to North Beach would be significantly more expensive than upgrading the Oysterville facilities, connecting to North Beach would eliminate the operational issues that Oysterville has been facing and would improve the reliability of the water system. Connecting to North Beach would also present significantly less risk to Oysterville customers.

**RECOMMENDATION**

If Oysterville were able to obtain adequate funding to complete Alternative 3b and work out an agreement with North Beach, this appears to be the most advantageous option for Oysterville to pursue because it will significantly increase the resources available to manage and operate the water system. However, if the project must be mostly self-funded, Alternative 3b would not be affordable and Alternative 1 is likely to be most effective for the cost.

**FUNDING**

There are some potential funding options available if Oysterville pursues any of these alternatives. One significant source of water utility funding in Washington is the Drinking Water State Revolving Fund (DWSRF), which is managed by the DOH. The amount and type of funding available depends on the type of project to be funded, and varies from year-to-year.

If Oysterville chooses to pursue consolidation with NBWD, the project would be eligible for funding through a DWSRF Construction Loan. Based on current DWSRF policy, this project may be eligible for a subsidy between 50 and 75 percent of the project cost, meaning only 25 to 50 percent of the project cost would need to be paid back as a loan. There may also be additional opportunity for up to 100 percent subsidy since the project



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would be addressing the treatment of manganese, which is considered to be an emerging contaminant by the DOH.

Table 4 summarizes the financial impact if a construction loan is taken on to consolidate and transfer ownership of the system, assuming the cost is borne only of Oysterville connections and if Oysterville customers were to become customers of North Beach Water.

**TABLE 4**  
**Financial Impact of NBWD Consolidation**

	Estimated Annual Loan Payment <sup>(1)</sup>	Total Oysterville Connections	Average Residential Water Cost Per Month <sup>(2)</sup>	Monthly Loan Repayment Cost Per Connection	Average Monthly Residential Bill	Change in Typical Residential Monthly Bill
No Subsidy	\$615,217	73	\$80.79	\$702.30	\$783.09	\$678.93
50 Percent Subsidy	\$307,609			\$351.15	\$431.94	\$327.77
75 Percent Subsidy	\$153,804			\$175.58	\$256.37	\$152.20
100 Percent Subsidy	--			\$--	\$80.79	(\$23.38)

- (1) DWSRF Construction Loans are issued at 2.25 percent interest to be paid over 20 years.
- (2) For current Oysterville customers. Based on historic Oysterville water usage billed at NBWD water rates.

If adequate funding cannot be obtained for consolidation, Oysterville may choose instead to pursue funding to improve its treatment facilities. This project is also eligible for a low-interest construction loan through DWSRF and may qualify for a subsidy up to 50 percent.

Table 5 summarizes the financial impact on Oysterville customers if a loan is taken on to make treatment improvements.

**TABLE 5**  
**Financial Impact of Oysterville Treatment Improvements**

	Estimated Annual Loan Payment <sup>(1)</sup>	Total Oysterville Connections	Average Residential Water Cost Per Month <sup>(2)</sup>	Monthly Loan Repayment Cost Per Connection	Average Monthly Residential Bill	Change in Typical Residential Monthly Bill
No Subsidy	\$29,888	73	\$104.17	\$34.12	\$138.29	\$34.12
35 Percent Subsidy	\$19,192			\$21.91	\$126.08	\$21.91
50 Percent Subsidy	\$14,944			\$17.06	\$121.23	\$17.06

- (1) DWSRF Construction Loans are issued at 2.25 percent interest to be paid over 20 years.
- (2) Calculated as the 2026 annual fee of \$1,250 divided by 12 months.



Technical Memorandum – Oysterville Source Alternatives Analysis  
April 6, 2026

The DWSRF Construction Loan application is due annually on November 30. The DOH typically issues a notice to water systems in January or February and generates loan agreements that summer. Once the contract is executed, the DOH requires that a Notice to Proceed is issued within 18 months and the funded project is completed within 4 years.

## **APPENDIX A**

### **SOURCE ALTERNATIVES COST ESTIMATES**

**OYSTERVILLE WATER SYSTEM  
SOURCE ASSESSMENT - WELL REHAB AND TREATMENT UPGRADE  
ENGINEER'S PRELIMINARY COST ESTIMATE  
JANUARY 2026**

<u>ITEM</u>		<u>ESTIMATED</u>		<u>UNIT</u>	
<u>NO.</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>		<u>PRICE</u>	<u>AMOUNT</u>
1.	Minor Changes	1	MC	\$10,000	\$10,000
2.	Mobilization, Cleanup, and Demobilization	1	LS	\$23,000	\$23,000
3.	Sitework	1	LS	\$20,000	\$20,000
4.	Excavation Safety Systems	1	LS	\$1,000	\$1,000
5.	Temporary Erosion Control	1	LS	\$1,000	\$1,000
6.	Building Modifications	1	LS	\$20,000	\$20,000
6.	Filter Equipment	1	LS	\$125,000	\$125,000
7.	Piping, Valves, and Appurtenances	1	LS	\$30,000	\$30,000
8.	Electrical, Telemetry, Integration	1	LS	\$50,000	\$50,000
9.	Submersible Well Pumps	2	EA	\$3,000	\$6,000
10.	Modifications to Disinfection System	1	LS	\$10,000	\$10,000

Subtotal	\$296,000
Sales Tax @ 8.2%	\$24,272
Subtotal	\$320,272
Contingency @ 20%	\$64,054
<b>Total Construction Cost</b>	<b>\$384,326</b>
Engineering and Admin @ 25%	\$96,082
<b>Total Project Cost</b>	<b>\$481,000</b>

**OYSTERVILLE WATER SYSTEM  
SOURCE ASSESSMENT - NEW WELL  
ENGINEER'S PRELIMINARY COST ESTIMATE  
JANUARY 2026**

<u>ITEM</u>		<u>ESTIMATED</u>	<u>UNIT</u>		
<u>NO.</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>		<u>PRICE</u>	<u>AMOUNT</u>
Drilling					
1.	Minor Changes	1	CALC	\$10,000	\$10,000
2.	Mobilization, Cleanup, and Demobilization	1	LS	\$40,000	\$40,000
3.	Sitework	1	LS	\$10,000	\$10,000
4.	Drill 12-In. Diam. Borehole	220	LF	\$450	\$99,000
5.	8-In. Diam. Well Casing	200	LF	\$160	\$32,000
6.	Surface Seal	1	LS	\$45,000	\$45,000
7.	Drive Shoe	1	EA	\$2,000	\$2,000
8.	Drive Shoe Cut	1	LS	\$10,000	\$10,000
9.	Disinfection and Testing	1	LS	\$5,000	\$5,000
10.	Site Restoration	1	LS	\$10,000	\$10,000
11.	Video Inspection	1	LS	\$3,000	\$3,000
12.	Step-Rate and Constant-Rate Pumping Tests	40	HR	\$600	\$24,000
13.	Furnish Screen and Fittings	1	LS	\$25,000	\$25,000

Subtotal	\$315,000
Sales Tax @ 8.2%	\$25,830
Subtotal	\$340,830
Contingency @ 20%	\$68,166
<b>Total Construction Cost</b>	<b>\$408,996</b>
Engineering and Admin @ 25%	\$102,249
<b>Total Project Cost</b>	<b>\$512,000</b>

Equipping					
1.	Minor Changes	1	MC	\$10,000	\$10,000
2.	Mobilization, Cleanup, and Demobilization	1	LS	\$15,000	\$15,000
3.	Trench Excavation Safety Systems	1	LS	\$1,000	\$1,000
4.	Temporary Erosion Control	1	LS	\$1,000	\$1,000
5.	Site Piping	150	LF	\$150	\$22,500
6.	Submersible Pumps	2	EA	\$2,500	\$5,000
7.	Electrical, Telemetry, Integration	1	LS	\$50,000	\$50,000

Subtotal	\$104,500
Sales Tax @ 8.2%	\$8,569

Subtotal	\$113,069
Contingency @ 20%	\$22,614
<b>Total Construction Cost</b>	<b>\$135,683</b>
Engineering and Admin @ 25%	\$33,921
<b>Total Project Cost</b>	<b>\$170,000</b>
<b>Total Well Development Cost</b>	<b>\$682,000</b>

**OYSTERVILLE WATER SYSTEM  
SOURCE ASSESSMENT - INTERTIE WITH SURFSIDE  
ENGINEER'S PRELIMINARY COST ESTIMATE  
JANUARY 2026**

<u>ITEM</u>		<u>ESTIMATED</u>		<u>UNIT</u>	
<u>NO.</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>		<u>PRICE</u>	<u>AMOUNT</u>
1.	Minor Changes	1	MC	\$10,000	\$10,000
2.	Mobilization, Cleanup, and Demobilization	1	LS	\$150,000	\$150,000
3.	Survey	1	LS	\$13,000	\$13,000
4.	Project Temporary Traffic Control	1	LS	\$50,000	\$50,000
5.	Trench Safety	1	LS	\$15,000	\$15,000
6.	DI Water Pipe, 6-Inch Diam. (Incl Bedding)	6,000	LF	\$160	\$960,000
7.	Additional Fittings	3,000	LB	\$5	\$15,000
8.	Removal and Replacement of Unsuitable Material	20	CY	\$60	\$1,200
9.	Gate Valves, 6-Inch	5	EA	\$1,500	\$7,500
10.	Erosion/Water Pollution Control	1	LS	\$5,000	\$5,000
11.	Clearing and Grubbing	1	LS	\$20,000	\$20,000
12.	Trench Backfill	5,200	TN	\$45	\$234,000
13.	Crushed Surfacing Top Course	1320	TN	\$45	\$59,400
14.	HMA Cl. 1/2" PG 58H-22	350	TN	\$200	\$70,000

Subtotal	\$1,610,100
Sales Tax @ 8.2%	\$132,028
Subtotal	\$1,742,128
Contingency @ 20%	\$348,426
<b>Total Construction Cost</b>	<b>\$2,090,554</b>
Engineering and Admin @ 25%	\$522,638
<b>Total Project Cost</b>	<b>\$2,614,000</b>

**OYSTERVILLE WATER SYSTEM  
SOURCE ASSESSMENT - INTERTIE WITH NORTH BEACH  
ENGINEER'S PRELIMINARY COST ESTIMATE  
APRIL 2026**

<b>CONNECTION TO NBWD</b>					
<u>ITEM</u>		<u>ESTIMATED</u>		<u>UNIT</u>	
<u>NO.</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>		<u>PRICE</u>	<u>AMOUNT</u>
1.	Minor Changes	1	MC	\$10,000	\$10,000
2.	Mobilization, Cleanup, and Demobilization	1	LS	\$280,000	\$280,000
3.	Survey	1	LS	\$13,000	\$13,000
4.	Project Temporary Traffic Control	1	LS	\$50,000	\$50,000
5.	Trench Safety	1	LS	\$15,000	\$15,000
6.	DI Water Pipe, 8-Inch Diam. (Incl Bedding)	12,500	LF	\$170	\$2,125,000
7.	Additional Fittings	5,000	LB	\$5	\$25,000
8.	Removal and Replacement of Unsuitable Material	20	CY	\$60	\$1,200
9.	Gate Valves, 8-Inch	5	EA	\$2,000	\$10,000
10.	Fire Hydrant Assembly	14	EA	\$9,000	\$126,000
11.	Erosion/Water Pollution Control	1	LS	\$5,000	\$5,000
12.	Clearing and Grubbing	1	LS	\$20,000	\$20,000
13.	Trench Backfill	10,000	TN	\$45	\$450,000
14.	Crushed Surfacing Top Course	2,700	TN	\$45	\$121,500
15.	HMA Cl. 1/2" PG 58H-22	700	TN	\$200	\$140,000

Subtotal	\$3,391,700
Sales Tax @ 8.2%	\$278,119
Subtotal	\$3,669,819
Contingency @ 20%	\$733,964
<b>Total Construction Cost</b>	<b>\$4,403,783</b>
Engineering and Admin @ 25%	\$1,100,946
<b>Total Project Cost</b>	<b>\$5,505,000</b>

<b>OYSTERVILLE PIPE AND METER REPLACEMENT</b>					
<u>ITEM</u>		<u>ESTIMATED</u>		<u>UNIT</u>	
<u>NO.</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>		<u>PRICE</u>	<u>AMOUNT</u>
1.	Minor Changes	1	MC	\$10,000	\$10,000
2.	Mobilization, Cleanup, and Demobilization	1	LS	\$240,000	\$240,000
3.	Survey	1	LS	\$10,000	\$10,000
4.	Project Temporary Traffic Control	1	LS	\$20,000	\$20,000
5.	Trench Safety	1	LS	\$10,000	\$10,000
6.	DI Water Pipe, 8-Inch Diam. (Incl Bedding)	8,000	LF	\$170	\$1,360,000
7.	Additional Fittings	2,000	LB	\$5	\$10,000
8.	Removal and Replacement of Unsuitable Material	10	CY	\$60	\$600

9.	Gate Valves, 8-Inch	10	EA	\$2,000	\$20,000
10.	Fire Hydrant Assembly	10	EA	\$9,000	\$90,000
11.	Erosion/Water Pollution Control	1	LS	\$5,000	\$5,000
12.	Clearing and Grubbing	1	LS	\$10,000	\$10,000
13.	Trench Backfill	6,500	TN	\$45	\$292,500
14.	Crushed Surfacing Top Course	1,750	TN	\$45	\$78,750
15.	HMA Cl. 1/2" PG 58H-22	500	TN	\$200	\$100,000
16.	Meter Replacement	68	EA	\$1,000	\$68,000

Subtotal	\$2,324,850
Sales Tax @ 8.2%	\$190,638
Subtotal	\$2,515,488
Contingency @ 20%	\$503,098
<b>Total Construction Cost</b>	<b>\$3,018,585</b>
Engineering and Admin @ 25%	\$754,646
<b>Total Project Cost</b>	<b>\$3,774,000</b>

## **APPENDIX B**

### **ASPECT CONSULTING EVALUATION**


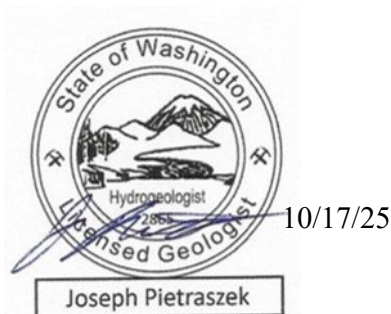
# MEMORANDUM

Project No. NWW0073

October 17, 2025

To: Mike Johnson, Gray and Osborne

From:



**Jay Pietraszek, LHG**  
Principal Hydrogeologist  
jay.pietraszek@aspectconsulting.com

**James Bush, LHG**  
Senior Hydrogeologist  
james.bush@aspectconsulting.com

Re: **Oysterville Water District - Preliminary Groundwater Supply Evaluation**

Aspect Consulting, a Geosyntec Company, (Aspect) is assisting Gray and Osborne, Inc. (G&O) with evaluating the physical availability of groundwater supply for Oysterville Water (Oysterville), a community water system, located on the central portion of the Long Beach Peninsula (Peninsula) in Washington state. Aspect understands that G&O, under contract to the Washington State Department of Health (DOH), is evaluating alternative groundwater sources, specifically from a deep groundwater source, to augment/replace Oysterville's current groundwater supply. This memorandum presents a preliminary evaluation of the potential for a Deep Aquifer source.

## 1 Key Findings

The potential viability of groundwater supply from Deep Aquifer sources is summarized below.

- Information on the hydrogeologic conditions in the Deep Aquifer in the Oysterville vicinity is limited but suggests there are multiple zones of relatively coarse sand deposits found between approximately 200 and 500 feet below ground surface (bgs) that could yield groundwater supplies sufficient to meet Oyserville's demand.
  - The stratigraphy of the unconsolidated deposits varies over short distances and test well drilling is needed to confirm site-specific conditions.
  - Existing well logs from the nearby Surfside Homeowners Association indicate productive zones between 150-200 feet bgs and 310-340 feet bgs.

- Deeper wells drilled in the vicinity of Ocean Park indicate additional zones may be present in the vicinity of 440 to 470 feet bgs.
- Water quality affects from seawater intrusion is a concern with potential Deep Aquifer groundwater supplies. Elevated chloride concentrations, indicative of seawater intrusion affects, was reported from a nearby well (Surfside Well 2) completed between 310 and 340 feet bgs. Similar poor water quality (due to seawater intrusion) has been found in wells as shallow as 235 feet bgs in other areas of the Peninsula.
  - In the vicinity of Oysterville's existing supply well, which is located about 0.25 miles from Willapa Bay, the saltwater interface may occur between -240 feet (elevation) in the summer (dry season) and -400 feet in the winter (wet season). A new well completed below approximately 210 feet bgs in this area may be affected by seawater/brackish conditions (at least seasonally).
  - The depth to the saltwater interface varies from east to west across the Peninsula with the deepest point being on or near the central north-south axis. A new well installed in the middle portion of the Peninsula, could potentially obtain suitable water quality from a well completed to depths of approximately 300-350 feet bgs.
- Additional water quality concerns related to iron, manganese, and organics, have been identified in both shallow and deep wells in the area, including the nearby Surfside wells, which is attributed to naturally occurring reducing conditions.
- In general, the best potential for good water quality may be found in zones of higher permeability (coarser) materials. However, the elevated iron, manganese, and organic carbon concentrations could be related to conditions present in the surficial or near surficial soils, meaning similar water quality concerns may be encountered in a new well installed near Oysterville's existing Well 2, regardless of depth.

The recommended next step, if warranted, is to conduct a test well drilling program near Well 2 (assuming installing a new well in a different location is not viable). The well should target the coarsest materials found within 210 feet of ground surface (or potentially slightly deeper if the new well can be located at a new location). The program should be performed using sonic-core drilling methods and include a long-term (24-hour) pumping test during the summer months to evaluate water quality.

## **2 Project Background**

Oysterville is a community water system located on the north-central portion of the Long Beach peninsula in Pacific County, Washington (Figure 1). Oysterville Water was formed in 1998 to combine the Oysterville Water Works (OWW) and the Oysterville Utility Company (OUC). DOH currently regulates Oysterville as a Group A system (ID 29240) with 76 total connections.

The water system is supplied by a single groundwater well (Well 2) that is 87 feet deep and completed in sand deposits that form a shallow, unconfined aquifer that is present throughout the Peninsula (Appendix A). Alternative (i.e., deeper) groundwater sources are being evaluated to augment/replace supplies from the existing well. The purpose of this preliminary groundwater

supply evaluation is to assess the potential viability of a deeper aquifer below Oysterville's existing supply well by reviewing existing information to understand the hydrogeologic conditions on the Peninsula near Oysterville.

The target yield for a new well needed to fully replace the existing well is approximately 40 gallons per minute (gpm). Aspect understands that Oysterville's current water use is authorized under a portion of the nearby Surfside Water Association's water right portfolio. Transferring an existing water right, or portion of an existing right, to a potentially deeper well could require demonstrating that the new well is completed in the same body of groundwater and is dependent on the site-specific conditions determined from testing of a new well.

### **3 Site Description**

The Peninsula is a narrow spit that extends north from the mouth of the Columbia River and separates the Pacific Ocean on the west from Willapa Bay on the east. The Peninsula was formed, and is still growing, from coastal sediment deposition which primarily comes from the Columbia River sediments that migrate north from tidal cycles. The Peninsula is about 20 miles long and averages approximately 1 to 2 miles in width. Oysterville is located about 8-9 miles south of the northern end of the Peninsula. Oysterville's existing supply well (Well 2) is about 0.25 miles from Willapa Bay ( Figure 1), in this area the Peninsula is about 1.7 miles wide.

The surface topography is influenced by wind deposited sand dunes that form parallel north-south trending ridges (Thomas, 1995). The crest of the dunes (i.e., foredunes) can reach 50 to 70 feet<sup>1</sup> and lower elevation areas (i.e., interiors of dune ridges, swales, etc.) range between 10 to 25 feet. Ground elevations in the vicinity of the Oysterville community range between approximately 10 and 15 feet. To the west of Oysterville, ground elevations rise to about 55 feet (dune crest) and then drop. The central portion of the Peninsula sits at approximately 20 feet, and it rises and falls again to elevations similar to that of another dune system near the Pacific Ocean (Figure 1).

### **4 Geologic Setting**

The surficial geology on the Peninsula consists of recent (Holocene age) shoreline deposits consisting of fine to coarse sand; which includes layers of organic rich sand, silt, and mud deposited in relict estuarine environments (Wells, 1989; Walsh et. al, 1987) that formed from coastal deposition and wind processes since the end of the Pleistocene glaciation (approximately last 12,000 years).

The recent sand deposits are up to several hundred feet thick or more, and in places it may be underlain by older (Pleistocene age) unconsolidated sediments. Material properties in the unconsolidated sediments are heterogenous and vary over short distances due to the presence of localized zones of mixed sand, silt, and clay deposits. The older sediments from the Pleistocene epoch were deposited over periods of fluctuating climate and sea levels, and the characteristics of the river systems depositing the sediment also varied. As a result, the physical characteristics and facies of the deeper sediments underlying the Peninsula are heterogenous and the available information indicates there are no distinctive layers or lenses that are uniform throughout the

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<sup>1</sup> All elevations provided in this Memorandum are approximate and referenced relative to mean sea level.

Peninsula. The sediments are predominantly sand (minor amounts of gravel are present in some areas) that are dissected and interspersed with numerous silt and clay lenses.

Sediment thickness on the Peninsula increases from south to north and is underlain by Eocene or Miocene age basalt and siltstone bedrock. Bedrock is exposed at or near ground surface on the southern portion of the Peninsula. A deep borehole drilled approximately 1 mile northwest of the Town of Oysterville intersected bedrock at approximately 1,400 feet bgs (Thomas, 1995). Bedrock depths in the vicinity of Ocean Park, approximately 3 miles south of Oysterville, is in the range of 700 feet bgs.

## **5 Hydrogeologic Setting**

Groundwater occurs at shallow depths throughout the Peninsula. Two primary aquifers have been identified in previous hydrogeologic studies on the Peninsula (Thomas, 1995; Carey and Yake, 1990): a shallow unconfined system present near the ground surface and a deeper confined layer of sand and gravel (in a silt/clay matrix) that are separated by a low permeability clay layer. For the purpose of this assessment, the term ‘Shallow Aquifer’ is used to describe groundwater conditions and wells completed in sediments that occur above the low permeability clay layer, and ‘Deep Aquifer’ is used to describe conditions and wells below the low permeability clay layer. As noted below, subsurface conditions vary, the clay layer may be laterally discontinuous, and multiple low permeability layers may be present in some areas. The vast majority of the existing wells on the Peninsula are completed in the Shallow Aquifer (including Oysterville’s existing well) and it is the focus of most available information.

Limited information on the deeper groundwater system(s) was found in previous studies and available well logs<sup>2</sup>. Only five well logs were identified for wells drilled deeper than 220 feet<sup>3</sup> on the Peninsula (north of Long Beach). All of these Deep Aquifer wells were drilled between Long Beach to the south and just beyond the Oysterville area to the north (Figure 1). The well logs are included in Appendix A.

Additional information is provided in the subsections below to describe the subsurface geologic units and water-bearing zones (Section 5.1); and to summarize documented groundwater conditions (Section 5.2) and potential water quality concerns in the Deep Aquifer (Section 5.3).

### **5.1 Hydrostratigraphy**

Most of the well logs from existing wells on the Peninsula show water-bearing, yellow/brown medium sand present from near ground surface to approximately 50 to 100 feet bgs. As noted above, most of the existing wells in the Oysterville area are completed in this Shallow Aquifer and information on subsurface conditions beneath the Shallow Aquifer is generally limited to the five available Deep Aquifer well drillers logs described above.

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<sup>2</sup> Well logs were obtained from the Washington State Department of Ecology (Ecology) Well Log Database: <https://apps.wa.gov/ecology/wellconstruction/map/WCLSWebMap/default.aspx>.

<sup>3</sup> A well log for the Surfside community (likely Well 1), drilled to over 200 feet, was also obtained from the database but the log was illegible and was not included in the review.

The stratigraphic sequences beneath the sand layer are not consistently shown or described in the well logs. This could be a function of both the natural variability in the subsurface, as well as inconsistencies associated with driller interpretations, drilling methods (quality of sample cuttings can vary by method), etc.<sup>4</sup> But the logs are generally consistent with the known hydrogeologic conditions and show some type of clay layer separating the upper sand units from another sequence of fine sand/silt and medium sand.

The lithology described on the Deep Aquifer well logs is shown on a schematic on Figure 2 (for comparison Oysterville's existing well is also shown). The figure shows variability in the occurrence, thickness, and depths of the various units and indicates the following:

- The upper-most sand layer (that comprises the shallow aquifer) grades to a grayish or blue/gray fine sand and silt that can extend to as deep as approximately 200 feet bgs.
- The fine sand layer is underlain by a low permeability layer which most logs indicate contains at least some clay. The top of the clay layer varies from approximately 100 to 200 feet bgs, ranges between approximately 10 and 40 feet in thickness, and may slope from east to west (Tracy, 1978).
- All of the well logs include a lower-permeability layer (clay or similar) that is underlain by sand (i.e., medium sand), with clean sand present between 140 and 260 feet bgs.
- The two deepest wells, Surfside Well 2 and Ocean Park, show a deeper sand layer that includes at least some gravel intersected between approximately 270 and 320 feet bgs.
  - The Surfside Well 2 (also referred to in other reports as Well J-2) was screened from 300 to 330 feet bgs, and the Ocean Park Well was screened from 261 to 274 feet bgs.
  - Both wells were later abandoned partially because of poor water quality (Section 5.3).
- The Ocean Park Well also shows a deeper sand and gravel layer between 440 and 460 feet bgs. No additional information is available for this zone.
- Carey and Yake (1990) hypothesize that the deep aquifer may extend from below the clay layer until bedrock is intersected at depths of 700 feet or more, which is likely based on the deepest available well log (Ocean Park Water) that intersected bedrock at 700 feet.
  - No information was found on geologic or hydrogeologic conditions in areas (including Oysterville) where sediment thicknesses may exceed 700 feet.
- The degree of hydraulic connectivity between the upper and lower portions of the Deep Aquifer is uncertain.

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<sup>4</sup> Driller's well logs may contain inaccuracies. While the logs are useful for providing a contextual understanding of subsurface conditions, they generally are not sufficiently accurate to fully characterize a specific unit. When reviewing driller's logs, it is important to consider that the driller's objective is to install a well not to study geologic conditions and often the cuttings from non-productive zones are not evaluated in detail during drilling.

- Both of the deeper wells (Surfside Well 2 and Ocean Park Water) show additional lower-permeability zones below the completion intervals of the other wells completed in the deep aquifer.
- Based on the reported thicknesses and material descriptions, complete hydraulic separation is unlikely. Complete separation would indicate no vertical leakage is reaching the deeper zones, meaning no recharge from the Shallow Aquifer or fresh water sources is reaching these zones.

### **5.2 Deep Aquifer Conditions and Well Yields**

The Deep Aquifer well logs show static water levels ranging from approximately 8 to 11 feet bgs, which is generally consistent with groundwater levels in the Shallow Aquifer. Long-term water level data for the Deep Aquifer are not available, but assuming similar seasonal and annual variability to the Shallow Aquifer: (1) water level fluctuations of about 5 feet are likely, and (2) groundwater levels (in terms of elevation) are highest in the center (north-south axis) of the Peninsula and then decrease (by approximately 2 to 4 feet) to the west (Pacific Ocean side) and east (Willapa Bay side).

The Deep Aquifer well logs report pumping tests at rates ranging from 85 to 207 gpm, with drawdown ranging between 30 and 95 feet. This translates to specific capacities (pumping rate divided by drawdown) of between 2 and 4 gpm per foot (gpm/ft), which is relatively low but the high amount of available drawdown (depth from static to the top of screen) allows for moderately high well yields.

The existing wells completed in the Deep Aquifer demonstrate that freshwater conditions are generally present (brackish water has been found in deeper wells, Section 5.3), which implies that the recharge to the Deep Aquifer is derived from vertical leakage from the Shallow Aquifer. For fresh water to be present in the Deep Aquifer, some hydraulic continuity between the Shallow and Deep Aquifers must exist. It is important to note that the clay layer may create confining conditions and act as an aquitard in localized areas (Thomas, 1995).

### **5.3 Water Quality**

The main water quality concerns for developing groundwater in the Deep Aquifer are related to: (1) seawater intrusion, and (2) reducing conditions and resulting elevated concentrations of iron, manganese, and organic carbon (which are found in both shallow and deep wells).

#### **Seawater Intrusion**

Conceptually, with respect to the potential for seawater intrusion, freshwater on the Peninsula occurs as a wedge created from precipitation recharge that is bounded laterally and vertically by seawater, as shown on Figure 3. The thickness of the wedge (i.e., the depth to which fresh water is present) is a function of the static groundwater elevation, which ranges between approximately 10 feet in the summer and 15 feet (above sea level) in the winter (Thomas, 1995).



### **Metals and Organic Carbon**

Elevated concentrations of iron and manganese, above secondary maximum contaminant levels (SMCL)<sup>6</sup>, have been identified in select wells on the Peninsula with elevated concentrations occurring primarily in deeper wells (Carey and Yake, 1990). The nearby Surfside wells also produce water with elevated iron, manganese, and organic matter which require treatment similar to Oysterville's existing Well 2 (Gray and Osborne, 2023).

The source of iron, manganese, and carbon is attributed to natural conditions that are likely associated with a reduction in oxidation potential (i.e., reducing conditions). Because there are only a limited number of existing deep wells near Oysterville, it is not clear if reducing conditions are present throughout the deep groundwater system. It's possible that better water quality could be obtained from coarser sand deposits (if present). However, it is also possible that the reducing conditions are a function of the surficial (or near surficial) soil conditions, meaning similar water quality concerns are likely to be encountered in a new well located near Oysterville's existing well, regardless of depth. Previous studies have noted that elevated iron concentrations were found in wells located between dune deposits, whereas wells completed on or near the top of the dunes contain little iron (Cline, 1969).

#### **5.4 Summary of Shallow Aquifer Conditions**

The shallow, unconfined aquifer (Shallow Aquifer) consists of dune sand and marine sand deposits that extends to about 100 feet bgs, but most existing wells are completed to 50 feet bgs or less. Groundwater occurs at shallow depths, ranging from 2 feet to 15 feet (elevation; depth to groundwater is variable due to surface topography). Groundwater elevations are higher in the central portion of the Peninsula than adjacent to Willapa Bay (east) or the Pacific Ocean (west), indicating that groundwater generally flows east or west from the center of the Peninsula. Seasonally groundwater elevations can fluctuate by about 5 feet, with the highest water levels occurring in the winter months in response to precipitation reach. In general, groundwater elevations in the central portion of the Peninsula range between 10 and 15 feet but can vary from year to year depending on precipitation patterns (Thomas, 1995).

The vast majority of the wells on the Peninsula and in the Oysterville area, including Oysterville's existing well, are completed in the shallow aquifer. The Washington State Department of Ecology's (Ecology) well log database has records for 430 water wells<sup>7</sup> on the northern portion of the Peninsula (i.e., north of Ocean Park area or Township 11/12N line). Of these, more than 95 percent (420) are less than 100 feet deep and only one well (Surfside Well 1) is more than 300 feet deep.

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<sup>6</sup> WAC 173-200-040 provides secondary MCLs of 0.30 mg/L for iron and 0.05 mg/L for manganese.

<sup>7</sup> Individual well logs were not reviewed or verified in detail. It is possible that Ecology's database contains duplicate records, includes wells that have since been decommissioned, and/or is otherwise inaccurate or missing information.

## **6 Legal Water Availability**

Demonstrating legal water availability is one of the regulatory requirements needed to obtain a new water right and specifically involves demonstrating that the proposed water use will not cause impairment to existing users or surface water bodies. The preliminary assessment of legal availability summarized below suggests there is legal water available for appropriation in the Oysterville vicinity and obtaining a new water right permit (or transferring an existing water right) is feasible.

Similarly, transferring an existing water right to a new well requires demonstrating that the current and proposed points of withdrawal are completed in the same body of groundwater. While some of the low-permeability layers could create localized areas of hydraulic separation, from a regulatory perspective it is unlikely that the restrictive layers create conditions sufficient to be categorized as a different and unique body of groundwater. Additional site-specific testing after a new well is installed may be necessary to provide confirmation.

Oysterville and the Long Beach Peninsula are part of Willapa Watershed or Water Resource Inventory Area (WRIA) 24. The majority of WRIA 24 encompasses the mainland area east of the Peninsula and includes all or parts of the Willapa, Nemah, and Naselle River basins. Currently there are no state regulated instream flow provisions for any surface water bodies in WRIA 24. Portions of most of the major river basins have administrative restrictions known as Surface Water Source Limitations (SWSLs), which can limit water availability, but none are located on the Peninsula.

There are existing water rights and existing exempt groundwater users in the Oysterville vicinity and demonstrating site specific potential for impairment of existing users is necessary for obtaining a new water right. Based on the information presented above (productivity and thickness of Shallow Aquifer, etc.), impairment to existing users is unlikely and demonstrating no potential for impairment should be relatively a straightforward part of a water right application process.

## **7 Conclusions and Recommendations**

Information on the hydrogeologic conditions below the Shallow Aquifer system on the Peninsula is limited, but it is likely that there are multiple zones of relatively coarse sand deposits found between approximately 200 and 500 feet bgs that could yield groundwater supplies sufficient to meet Oyserville's demand. The stratigraphy of the unconsolidated deposits varies over short distances and test well drilling is needed to confirm site-specific conditions. But existing well logs from the nearby Surfside Homeowners Association indicate productive zones between 150-200 feet bgs and 310-340 feet bgs. Additional zones may be present in the vicinity of 440 to 470 feet bgs.

Seawater intrusion and effects from reducing conditions are the primary water quality concerns for potential groundwater supplies from the deep aquifer. Poor water quality was reported from a nearby deep well (Surfside Well 2) completed between 310 and 340 feet bgs that necessitated well abandonment. Deeper wells in other parts of the Peninsula have reported water quality concerns in wells as shallow as 235 feet bgs. In the vicinity of Oysterville's Well 2, seawater intrusion-related concerns are likely to be encountered at slightly shallower depths, in the range of 210 feet bgs, due to its proximity to Willapa Bay.

Other Surfside wells completed between about 180 and 220 feet bgs show elevated concentrations of iron, manganese, and organic carbon. A new well completed to a similar depth in the vicinity of Oysterville's existing supply could also exhibit similar water quality issues if geologic conditions are consistent. These water quality issues are likely caused by naturally occurring reducing conditions that may not be present in coarser sand deposits (if present).

The depth to the saltwater interface varies from east to west across the Peninsula with the deepest point being on or near the central north-south axis. In this area, it may be possible to find suitable water quality from a well completed to depths of approximately 300-350 feet bgs. Wells completed below 350 feet bgs anywhere on the Peninsula will likely be affected by seawater (at least seasonally).

Additional discussions with Oysterville and G&O may be warranted to discuss project objectives and recommendations for next steps. Potential next steps may include identifying a potential new well location site (if possible) and conducting a test well drilling program to confirm site-specific conditions. The program should be performed using sonic-core drilling methods and include a long-term (24-hour) pumping test during the summer months to evaluate water quality. Because Oysterville demand rates are relatively low (in the range of 40 gpm), the test well could be used as a production well following testing if the results are positive (no need for construction modifications or drilling a new well).

## **8 References**

- Cary, B., and B. Yake (Cary and Yake), 1990, Summary Report - Long Beach Peninsula Ground Water Study. Department of Ecology, Water Quality Program, Environmental Investigations, Toxics Investigations/Groundwater Monitoring Section. Water Way Segment 11-24-GW, Technical Memorandum WA-24-0010/90-e09. March 1990.
- Cline, R.C., 1969. A Brief Description of the Ground-Water Resources of Pacific and Wahkiakum Counties, Washington.
- Gray & Osborne Inc. (Gray and Osborne), 1991. Surfside Homeowners Association, Water Wells No. J-3 & J-2A ("J" Street Well Field), Report on Aquifer Testing. March 20, 1991.
- Gray & Osborne Inc. (Gray and Osborne), 2023. Surfside Homeowners Association, Water System Plan. September 2023.
- Thomas, B.E., 1995. Ground-Water Flow and Water Quality in the Sand Aquifer of Long Beach Peninsula, Washington. United States Geological Survey (USGS) Open File Report 95-4026.
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- Walsh, T.J., M.E. Korosec, W.M. Phillips, R.L. Logan, and H.W. Schasse, 1987, Geologic Map of Washington-Southwest Quadrant. Washington Department of Natural Resources, Division of Geology and Earth Resources, Geologic Map GM-34.
- Wells, R.E., 1989, Geologic map of the Cape Disappointment-Naselle River area, Pacific and Wahkiakum Counties, Washington: U.S. Geological Survey, Miscellaneous Investigations Series Map I-1832, scale 1:62,500.

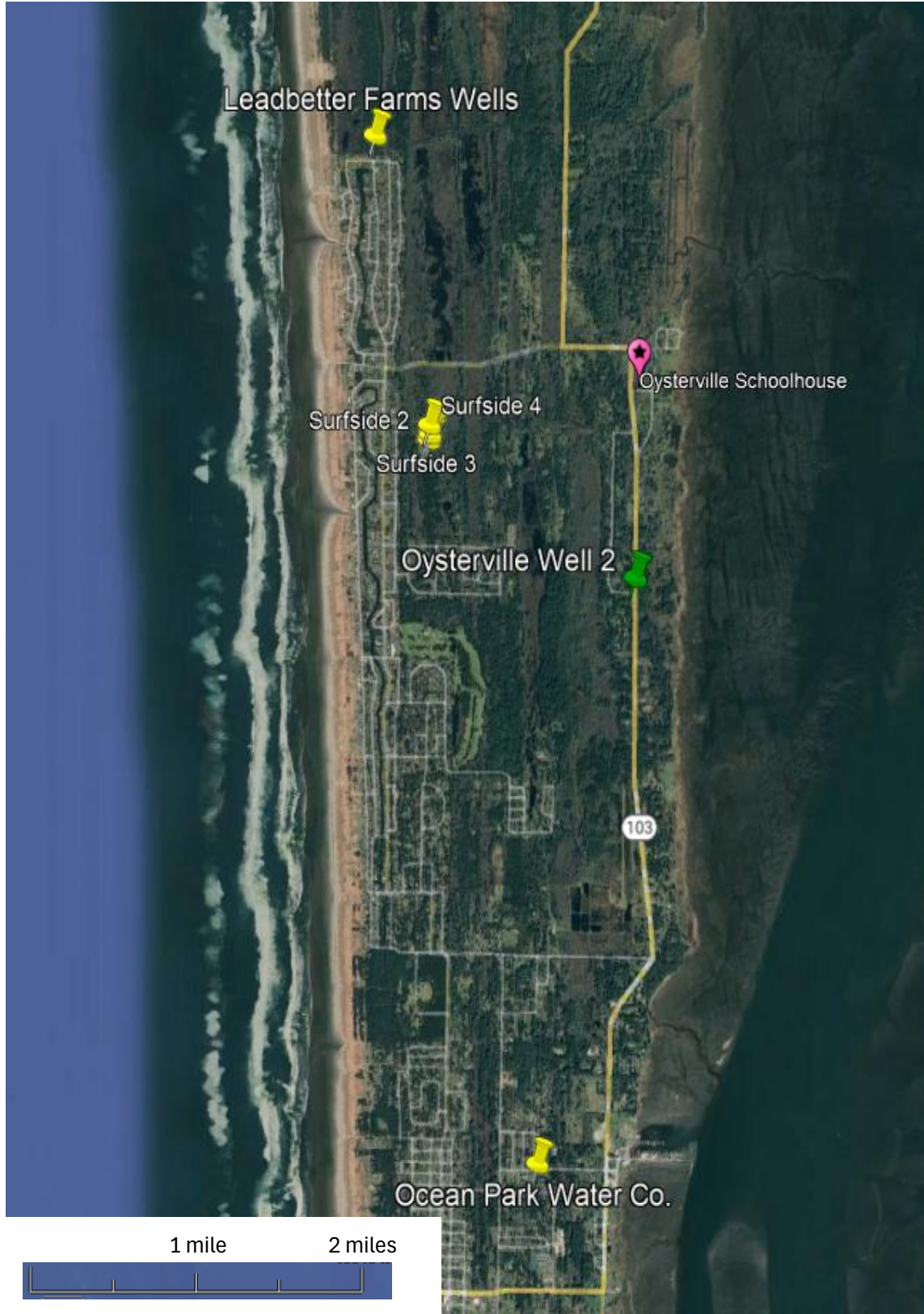
## **Limitations**

Work for this project was performed for the Gray and Osborne Inc. (Client), and this memorandum was prepared in accordance with generally accepted professional practices for the nature and conditions of work completed in the same or similar localities, at the time the work was performed. This memorandum does not represent a legal opinion. No other warranty, expressed or implied, is made.

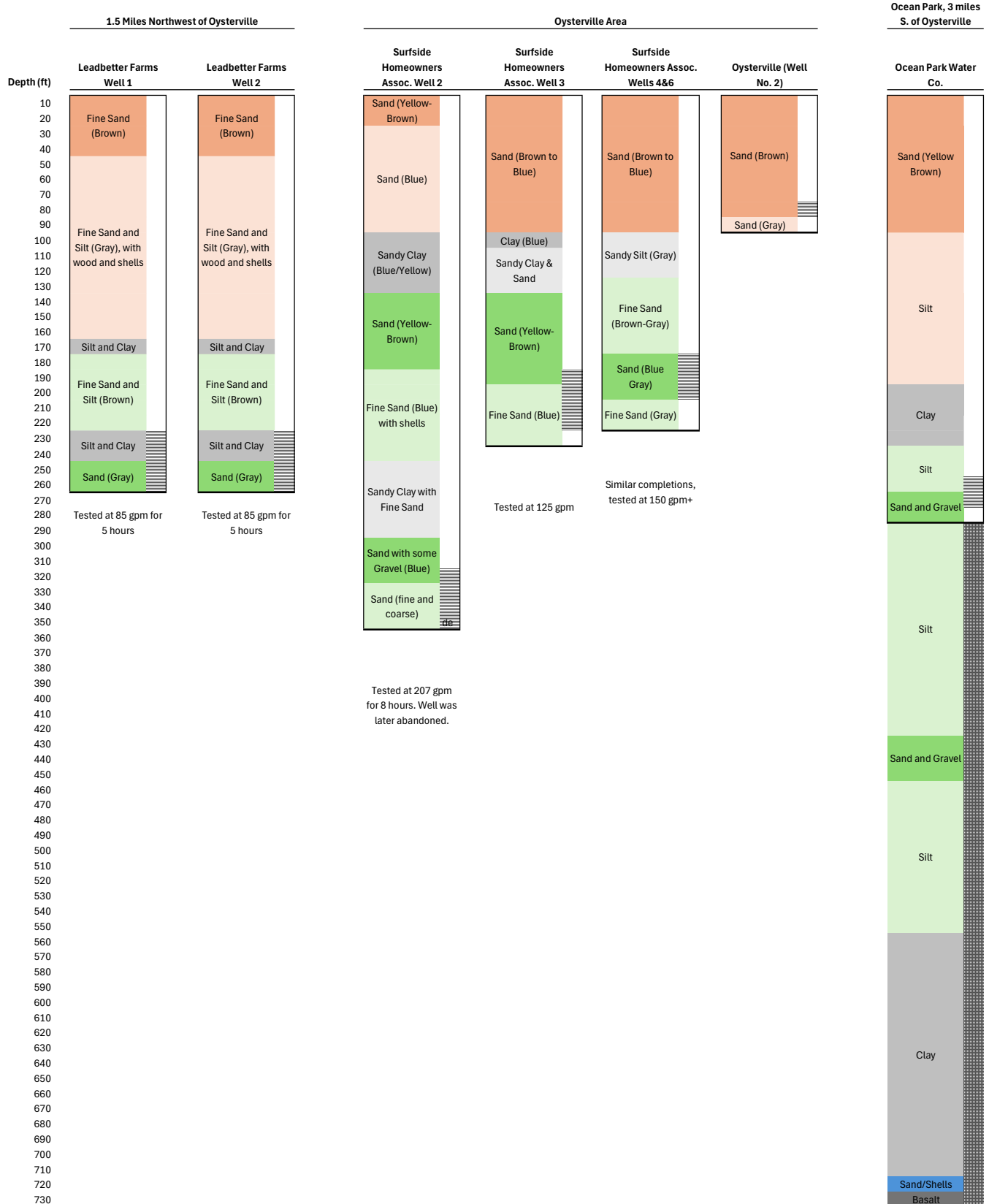
All reports prepared by Aspect Consulting for the Client apply only to the services described in the Agreement(s) with the Client. Any use or reuse by any party other than the Client is at the sole risk of that party, and without liability to Aspect Consulting. Aspect Consulting's original files/reports shall govern in the event of any dispute regarding the content of electronic documents furnished to others.

Attachments:   Figure 1 – Site Map  
                    Figure 2 – Schematic of Stratigraphic Sequences from Existing Wells  
                    Appendix A – Well Logs

# FIGURES



**Figure 1  
Site Map**



**Figure 2**  
**Schematic of Stratigraphic Sequences from Existing Wells**  
 Preliminary Groundwater Supply Evaluation  
 Oysterville, WA

# **APPENDIX A**

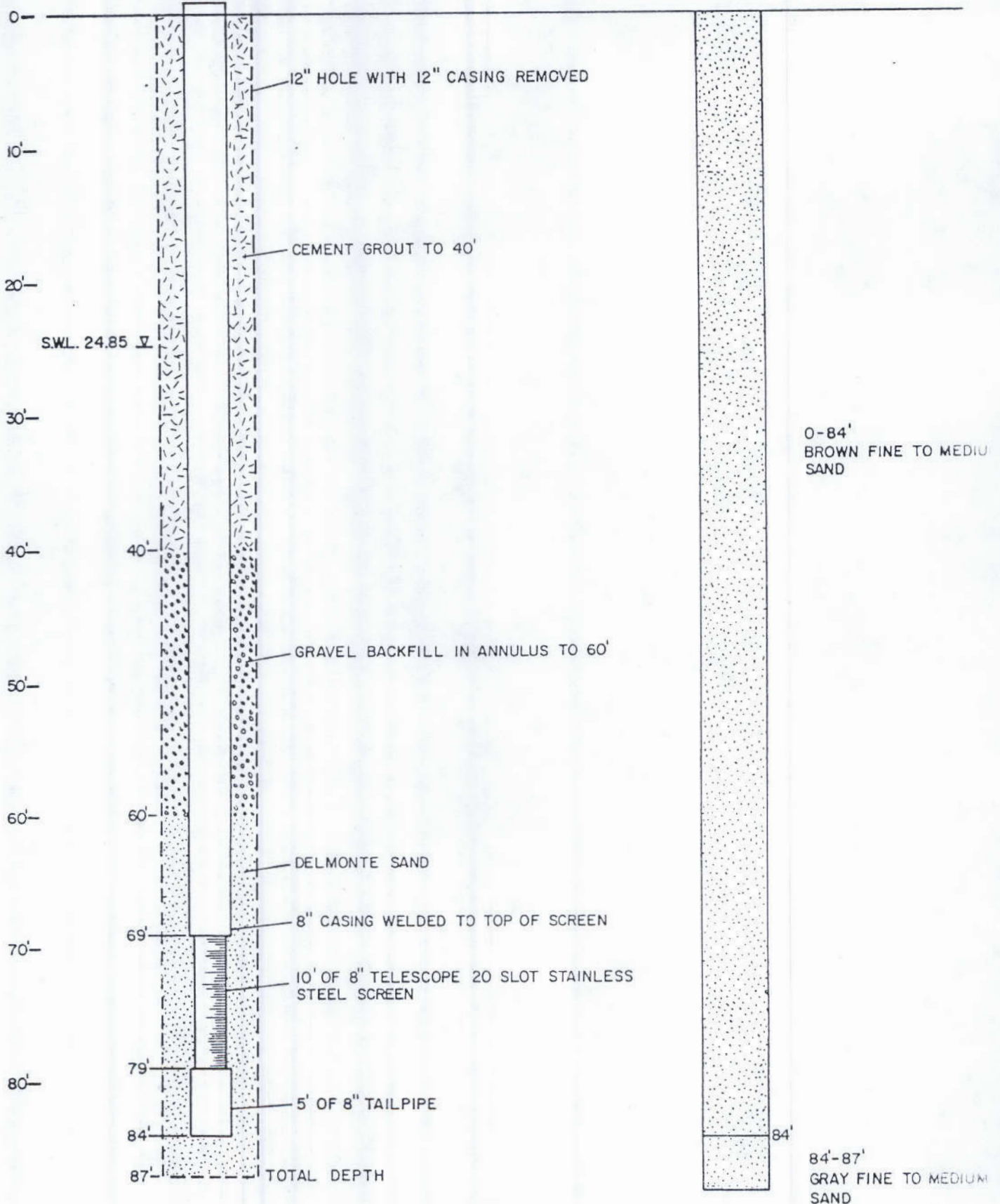
## **Well Logs**

Oysterville Well 2

H.A. ESPY CO., ESPY ESTATES WELL NO. 2

BY: ROBINSON AND NOBLE INC.  
GROUND WATER GEOLOGISTS  
TACOMA, WASHINGTON

DRILLED BY: STORY AND ARMSTRONG  
DRILLING CO.  
OCTOBER 1979





# WATER WELL REPORT

Original & 1<sup>st</sup> copy - Ecology, 2<sup>nd</sup> copy - owner, 3<sup>rd</sup> copy - driller

Construction/Decommission ("x" in circle)

Construction

Decommission ORIGINAL INSTALLATION Notice

256364 of Intent Number \_\_\_\_\_

PROPOSED USE:  Domestic  Industrial  Municipal  
 DeWater  Irrigation  Test Well  Other \_\_\_\_\_

TYPE OF WORK: Owner's number of well (if more than one) \_\_\_\_\_  
 New well  Reconditioned  Deepened Method:  Dug  Bored  Driven  
 Cable  Rotary  Jetted

DIMENSIONS: Diameter of well 8 inches, drilled 253 ft.  
 Depth of completed well 253 ft.

CONSTRUCTION DETAILS  
 Casing  Welded 8 " Diam. from +1 ft. to 242'6" ft.  
 Installed:  Liner installed " Diam. from " ft. to " ft.  
 Threaded 6" header " Diam. from 234'3" ft. to 237'6" ft.

Perforations:  Yes  No  
 Type of perforator used \_\_\_\_\_  
 SIZE of perfs \_\_\_\_\_ in. by \_\_\_\_\_ in. and no. of perfs from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

Screens:  Yes  No  KKK-Pac Location 237'6"  
 Manufacturer's Name Midwest / Sandblocker  
 Type Stainless steel Model No. \_\_\_\_\_  
 Diam. 6" Slot size mesh from 237'6" ft. to 253 ft.  
 Diam. \_\_\_\_\_ Slot size \_\_\_\_\_ from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

Gravel/Filter packed:  Yes  No  Size of gravel/sand \_\_\_\_\_  
 Materials placed from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

Surface Seal:  Yes  No To what depth? 20 ft.  
 Material used in seal Bentonite  
 Did any strata contain unusable water?  Yes  No  
 Type of water? \_\_\_\_\_ Depth of strata \_\_\_\_\_  
 Method of sealing strata off \_\_\_\_\_

PUMP: Manufacturer's Name \_\_\_\_\_  
 Type: \_\_\_\_\_ H.P. \_\_\_\_\_

WATER LEVELS: Land-surface elevation above mean sea level \_\_\_\_\_ ft.  
 Static level 10'3" ft. below top of well Date 3-6-07  
 Artesian pressure \_\_\_\_\_ lbs. per square inch Date \_\_\_\_\_  
 Artesian water is controlled by \_\_\_\_\_ (cap, valve, etc.)

WELL TESTS: Drawdown is amount water level is lowered below static level  
 Was a pump test made?  Yes  No If yes, by whom? H.D.C.  
 Yield: 85 gal./min. with 31 ft. drawdown after 5 hrs.  
 Yield: \_\_\_\_\_ gal./min. with \_\_\_\_\_ ft. drawdown after \_\_\_\_\_ hrs.  
 Yield: \_\_\_\_\_ gal./min. with \_\_\_\_\_ ft. drawdown after \_\_\_\_\_ hrs.

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)  

Time	Water Level	Time	Water Level	Time	Water Level
_____	_____	_____	_____	_____	_____

Date of test 3-6-07  
 Bailer test 23 gal./min. with 10 ft. drawdown after 4 hrs.  
 Airtest \_\_\_\_\_ gal./min. with stem set at \_\_\_\_\_ ft. for \_\_\_\_\_ hrs.  
 Artesian flow \_\_\_\_\_ g.p.m. Date \_\_\_\_\_  
 Temperature of water 53.4 Was a chemical analysis made?  Yes  No

CURRENT

Notice of Intent No. W 218465

Unique Ecology Well ID Tag No. ALH-423

Water Right Permit No. \_\_\_\_\_

Property Owner Name Leadbetter Farms LLC

Well Street Address 35710 I St.

City Ocean Park County Pacific

Location NE 1/4-1/4 SE 1/4 Sec 28 Twn 13NR11W <sup>EWM or WWM</sup> circle one

Lat/Long (s, t, r) Lat Deg \_\_\_\_\_ Lat Min/Sec \_\_\_\_\_

Still **REQUIRED** Long Deg \_\_\_\_\_ Long Min/Sec \_\_\_\_\_

Tax Parcel No. 13112823017

### CONSTRUCTION OR DECOMMISSION PROCEDURE

Formation: Describe by color, character, size of material and structure, and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information. (USE ADDITIONAL SHEETS IF NECESSARY.)

MATERIAL	FROM	TO
Brown sand, fine	0	38
Grey fine sand & silt	38	97
Grey fine sand, silt & wood	97	106
Grey fine sand & silt	106	154
Grey silt, clay & shells	154	158
Grey fine sand, silt & shells	158	170
Brown fine sand & silt	170	230
Brown & yellow sand, silt & clay	230	242
Grey sand (water)	242	252
Grey sand & silt	252	253

Hardness 8

Iron 1.4

PH. 7.7

**RECEIVED**

**MAR 26 2007**

Washington State  
 Department of Ecology

Start Date 2-20-07 Completed Date 3-7-07

**WELL CONSTRUCTION CERTIFICATION:** I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

Driller  Engineer  Trainee Name (Print) Terry Johnson  
 Driller/Engineer/Trainee Signature Terry Johnson  
 Driller or trainee License No. 0286

Drilling Company Hansen Drilling Co., Inc.  
 Address 6711 NE. 58th Ave.  
 City, State, Zip Vancouver, WA 98661

If TRAINEE,  
 Driller's Licensed No. \_\_\_\_\_  
 Driller's Signature \_\_\_\_\_

Contractor's  
 Registration No. HANSED\*377NT Date 3-13-07

Ecology is an Equal Opportunity Employer.







Surfside Homeowners Association Well 3 (J-3)

WATER WELL REPORT

Start Card No. 061999

Original and First Copy with Department of Ecology
Second Copy--Owner's Copy
Third Copy--Driller's Copy

STATE OF WASHINGTON

Water Right Permit No.

(1) OWNER: Name SURFSIDE HOMEOWNERS ASOC. Address 31310 H Street, Ocean Park, WA 98640

(2) LOCATION OF WELL: County Pacific S W NW 1/4 Sec 9 T. 12 N. R. 11 W. M

(2a) STREET ADDRESS OF WELL (or nearest address) Access from Div. 7 blk 7 Lot 3

(3) PROPOSED USE: Domestic Irrigation DeWater Industrial Test Well Municipal Other community

(4) TYPE OF WORK: Owner's number of well (if more than one) 3
Abandoned New well Deepened Reconditioned Method: Dug Cable Rotary Bored Driven Jetted

(5) DIMENSIONS: Diameter of well 8 inches. Drilled 223 feet. Depth of completed well 222 ft.

(6) CONSTRUCTION DETAILS: Casing installed 8" diam. from 3 ft. to 195 ft. Welded Liner installed Threaded Perforations: Yes No Type of perforator used Size of perforations Screens: Yes No 8" double K packer from 191' to 192' Manufacturer's Name Johnson Type telescoping Model No. SS Diam. 8 Slot size 9 from 192 ft. to 217 ft. Diam. 8 Slot size 8 from 217 ft. to 222 ft. Gravel packed: Yes No Size of gravel Gravel placed from Surface seal: Yes No To what depth? 20 ft. Material used in seal cement grout Did any strata contain unusable water? Yes No Type of water? Depth of strata Method of abating strata off

(7) PUMP: Manufacturer's Name Type H.P.

(8) WATER LEVELS: Land surface elevation above mean sea level ft. Static level 10.48 ft. below top of well Date 01-23-91 Artesian pressure lbs. per square inch Date Artesian water is controlled by (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level Was a pump test made? Yes No Yield: 125 gal./min. with 30.5 ft. drawdown after hrs.

Table with 6 columns: Time, Water Level, Time, Water Level, Time, Water Level. Data points: 0, 42.78, 10, 12.89, 30, 12.27

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Date of test Bailer test gal./min. with ft. drawdown after hrs. Airtest gal./min. with stem set at ft. for hrs. Artesian flow p.p.m. Date Temperature of water Was a chemical analysis made? Yes No

(10) WELL LOG or ABANDONMENT PROCEDURE DESCRIPTION

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated with at least one entry for each change of information.

Table with 3 columns: MATERIAL, FROM, TO. Data: Sand gray-blue (0-2), Sand yellow-gray (2-18), Sand blue (18-64), Sand blue-gray w/shells (64-70), Sand blue-gray (70-95), Clay blue (95-98), Sand & sandy-clay gray (98-132), Sand yellow-brown (132-183), Sand blue fine (183-218), Sand blue very fine (218-223)

Work started Jan 08, 1991 10. Completed Feb. 01 1991

WELL CONSTRUCTOR CERTIFICATION

I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

NAME Dale McGhee & Sons Well Drilling, Inc. (PERSON, FIRM, OR CORPORATION) (TYPE OR PRINT)

Address 3032 Allen Street Kelso, WA 98626

(Signed) Dale McGhee License No. 0298 (WELL DRILLER)

Contractor's Registration No. DALEMI#212MC Date March 08 1991

(USE ADDITIONAL SHEETS IF NECESSARY)

FIGURE 6

File Original and First Copy with  
Department of Ecology  
Second Copy — Owner's Copy  
Third Copy — Driller's Copy

# WATER WELL REPORT

STATE OF WASHINGTON

Start Card No. W 18548

UNIQUE WELL I.D. # ABG 630

Water Right Permit No. \_\_\_\_\_

(1) OWNER: Name Surfside Homeowners Assoc. Address 31310 H St Ocean Park WA. 98640

(2) LOCATION OF WELL: County Pacific S 1/4 NW 1/4 Sec 9 T. 12 N., R. 11 W.

(2a) STREET ADDRESS OF WELL (or nearest address) J Place Ocean Park

(3) PROPOSED USE:  Domestic  Industrial  Municipal   
 Irrigation  Test Well  Other   
 DeWater

(4) TYPE OF WORK: Owner's number of well (if more than one) J 4  
Abandoned  New well  Method: Dug  Bored   
Deepened  Cable  Driven   
Reconditioned  Rotary  Jetted

(5) DIMENSIONS: Diameter of well 8 inches.  
Drilled 220 feet. Depth of completed well 208 feet.

(6) CONSTRUCTION DETAILS:  
Casing installed: 8 " Diam. from 0 ft. to 182 ft.  
Welded  Liner installed  Threaded   
Diam. from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.  
Diam. from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

Perforations: Yes  No   
Type of perforator used \_\_\_\_\_  
SIZE of perforations \_\_\_\_\_ in. by \_\_\_\_\_ in.  
\_\_\_\_\_ perforations from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.  
\_\_\_\_\_ perforations from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.  
\_\_\_\_\_ perforations from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

Screens: Yes  No   
Manufacturer's Name Cook  
Type stainless wire wrap Model No. \_\_\_\_\_  
Diam. 7" Slot size 8 from 182 ft. to 203 ft.  
Diam. \_\_\_\_\_ Slot size \_\_\_\_\_ from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

Gravel packed: Yes  No  Size of gravel \_\_\_\_\_  
Gravel placed from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

Surface seal: Yes  No  To what depth? 18 ft.  
Material used in seal cement bentonite  
Did any strata contain unusable water? Yes  No   
Type of water? \_\_\_\_\_ Depth of strata \_\_\_\_\_  
Method of sealing strata off \_\_\_\_\_

(7) PUMP: Manufacturer's Name \_\_\_\_\_  
Type: \_\_\_\_\_ H.P. \_\_\_\_\_

(8) WATER LEVELS: Land-surface elevation \_\_\_\_\_ ft.  
Static level 9' BLS ft. below top of well Date \_\_\_\_\_  
Artesian pressure \_\_\_\_\_ lbs. per square inch Date \_\_\_\_\_  
Artesian water is controlled by \_\_\_\_\_ (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level  
Was a pump test made? Yes  No  If yes, by whom? Holt drlg.  
Yield: 150 gal./min. with 42 ft. drawdown after 24 hrs.

" " " "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test \_\_\_\_\_  
Bailer test 25 gal./min. with 5 ft. drawdown after 1 hrs.  
Airstest \_\_\_\_\_ gal./min. with stem set at \_\_\_\_\_ ft. for \_\_\_\_\_ hrs.  
Artesian flow \_\_\_\_\_ g.p.m. Date \_\_\_\_\_  
Temperature of water \_\_\_\_\_ Was a chemical analysis made? Yes  No

## (10) WELL LOG or ABANDONMENT PROCEDURE DESCRIPTION

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information.

MATERIAL	FROM	TO
<u>brown sand</u>	<u>0</u>	<u>3</u>
<u>silty brown sand</u>	<u>3</u>	<u>23</u>
<u>blue gray sand / shells and wood WB</u>	<u>23</u>	<u>93</u>
<u>gray sandy silt</u>	<u>93</u>	<u>125</u>
<u>WB fine yellow brown sand</u>	<u>125</u>	<u>170</u>
<u>WB fine gray brown sand</u>	<u>170</u>	<u>183</u>
<u>WB blue gray sand</u>	<u>183</u>	<u>205</u>
<u>gray sandy silt</u>	<u>205</u>	<u>220</u>

RECEIVED  
 94 SEP -11 A9:29  
 WASHINGTON STATE DEPARTMENT OF ECOLOGY  
 5 WASHINGTON CENTER

Work Started 6/15, 19\_\_\_\_ Completed 7/7, 1994

### WELL CONSTRUCTOR CERTIFICATION:

I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

NAME Holt Drilling Inc. (PERSON, FIRM, OR CORPORATION) (TYPE OR PRINT)

Address 10621 Todd Rd E.

(Signed) [Signature] License No. 1094 (WELL DRILLER)

Contractor's Registration No. HOLTEI\*08705 Date 8-19, 1994

(USE ADDITIONAL SHEETS IF NECESSARY)



The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

File Original and First Copy with  
Department of Ecology  
Second Copy — Owner's Copy  
Third Copy — Driller's Copy

# WATER WELL REPORT

UNIQUE WELL I.D. # ACK 098

STATE OF WASHINGTON

Water Right Permit No. \_\_\_\_\_

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

(1) OWNER: Name SURFSIDE HOME OWNERS ASSOC. Address 31310 HST. OCEAN PARK WASH.  
 (2) LOCATION OF WELL: County PACIFIC S 1/4 NW 1/4 Sec 9 T. 12 N. R. 11 W.M.  
 (2a) STREET ADDRESS OF WELL (or nearest address) J PLACE OCEAN PARK

(3) PROPOSED USE:  Domestic  Industrial  Municipal   
 Irrigation  Test Well  Other   
 DeWater  Rotary  Jetted

(4) TYPE OF WORK: Owner's number of well (if more than one) J-6  
 Abandoned  New well  Method: Dug  Bored   
 Deepened  Cable  Driven   
 Reconditioned  Rotary  Jetted

(5) DIMENSIONS: Diameter of well 8 inches.  
 Drilled 206 feet. Depth of completed well 204 feet.

(6) CONSTRUCTION DETAILS:  
 Casing Installed: 8 " Diam. from 12 ft. to 180 ft.  
 Welded  Liner Installed  Threaded

Perforations: Yes  No   
 Type of perforator used \_\_\_\_\_  
 SIZE of perforations \_\_\_\_\_ in. by \_\_\_\_\_ in.  
 \_\_\_\_\_ perforations from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.  
 \_\_\_\_\_ perforations from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.  
 \_\_\_\_\_ perforations from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

Screens: Yes  No   
 Manufacturer's Name JOHNSON  
 Type 304 STAINLESS WIRE WRAP Model No. \_\_\_\_\_  
 Diam. 8" TELE Slot size .008 from 180 ft. to 300 ft.  
 Diam. \_\_\_\_\_ Slot size \_\_\_\_\_ from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

Gravel packed: Yes  No  Size of gravel \_\_\_\_\_  
 Gravel placed from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

Surface seal: Yes  No  To what depth? 18 ft.  
 Material used in seal BENTONITE  
 Did any strata contain unusable water? Yes  No   
 Type of water? \_\_\_\_\_ Depth of strata \_\_\_\_\_  
 Method of sealing strata off \_\_\_\_\_

(7) PUMP: Manufacturer's Name \_\_\_\_\_ H.P. \_\_\_\_\_  
 Type: \_\_\_\_\_

(8) WATER LEVELS: Land-surface elevation above mean sea level \_\_\_\_\_ ft.  
 Static level 7'-9" ft. below top of well Date 11-22-96  
 Artesian pressure \_\_\_\_\_ lbs. per square inch Date \_\_\_\_\_  
 Artesian water is controlled by \_\_\_\_\_ (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level  
 Was a pump test made? Yes  No  If yes, by whom? HOLT DRILLING  
 Yield: 160 gal./min. with 48 ft. drawdown after 27 hrs.

Time	Water Level	Time	Water Level	Time	Water Level

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)  
 Date of test \_\_\_\_\_  
 Bailer test \_\_\_\_\_ gal./min. with \_\_\_\_\_ ft. drawdown after \_\_\_\_\_ hrs.  
 Airtest \_\_\_\_\_ gal./min. with stem set at \_\_\_\_\_ ft. for \_\_\_\_\_ hrs.  
 Artesian flow \_\_\_\_\_ g.p.m. Date \_\_\_\_\_  
 Temperature of water \_\_\_\_\_ Was a chemical analysis made? Yes  No

(10) WELL LOG or ABANDONMENT PROCEDURE DESCRIPTION

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information.

MATERIAL	FROM	TO
GRAY SAND	0	2
BROWN FINE SILTY SAND	2	18
BLUE GRAY FINE SAND WITH SHELLS + WOOD WATER BEARING	18	90
GRAY SANDY SILT	90	128
YELLOW BROWN FINE SAND WATER BEARING	128	168
BROWN + GRAY FINE SAND	168	180
BLUE GRAY FINE SAND	180	201
GRAY FINE SAND WITH SHELLS + CLAY LAYERS	201	206

RECEIVED  
 FEB 24 1996  
 DEPARTMENT OF ECOLOGY  
 WELL DRILLING UNIT

Work Started 11-11 1996 Completed 11-22 1996

WELL CONSTRUCTOR CERTIFICATION:

I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

NAME HOLT DRILLING INC. (PERSON, FIRM, OR CORPORATION) (TYPE OR PRINT)  
 Address 10621 TODD RD. E. PUYALLUP, WASH.  
 (Signed) [Signature] License No. 1691  
 (WELL DRILLER)

Contractor's Registration No. HOLT DE # 13609 Date 12-2 19 96

(USE ADDITIONAL SHEETS IF NECESSARY)

Ecology is an Equal Opportunity and Affirmative Action employer. For special accommodation needs, contact the Water Resources Program at (206) 407-6600. The TDD number is (206) 407-6006.

Ocean Park Water Co. Deep Well (from Tracy, 1978)

TABLE 7.--Records of wells deeper than 50 feet--Continued

Material	Thickness (ft)	Depth (ft)
12/11-28G1. Ocean Park Water Co. Altitude 15 ft. Drilled by Leonard Taylor, "before June 1963." Completed 82 ft x 8 inches; screened 8 inches 57-77 ft; static water level 7.68 ft above msl on Aug. 28, 1968; <sup>a</sup> 125 gal/min with 55 ft draw- down; specific conductance 150 umhos; chloride 20 mg/L; temperature 52°F.		
Sand, yellow-----	73	73
Sand, blue-----	114	187
Clay, blue-----	28	215
Silt-----	17	232
Clay, blue-----	19	251
Silt-----	23	274
Gravel-----	2	276
12/11-28G2. Ocean Park Water Co. Altitude 15 ft. Drilled by Leonard Taylor, 1968. Completed 274 ft x 8 inches; casing perforated 261-274 ft; static water level 8.68 ft above msl on Aug. 28, 1968. <sup>a</sup>		
Sand, yellow-----	58	58
Sand, black-----	32	90
Silt-----	95	185
Clay, blue-----	41	226
Silt-----	34	260
Pea gravel and sand-----	10	270
Gravel-----	5	275
Silt-----	143	418
Sand and pea gravel-----	25	443
Silt-----	107	550
Clay, blue-----	172	722
Shells and sand-----	5	727
Basalt-----	3	730
12/11-33A1. Rushlight Farms Estates. Altitude 20 ft. Drilled by Jannsen Drilling Co., 1953. Completed 56 ft x 8 inches; fine sand to 56 ft, gravel packed 20-56 ft; static water level 15 ft, August 1953. Well not used because "no water" reported.		
12/11-33B1. Coos Bay Development Co. Altitude 20 ft. Drilled by Jannsen Drilling Co., August 1953. Completed 100 ft x 8 inches; screened 85-100 ft; static water level 9.80 ft, Aug. 30, 1968; pump test 250 gal/min with 75 ft drawdown, August 1953; specific conductance, 140 umhos; chloride 8.6 mg/L.		
Sand, fine-----	43	43
Sand and driftwood-----	33	76
Sand, fine-----	24	100