Application for a Permit to Use

Groundwater

OREGON WATER RESOURCES DEPARTMENT

Oregon Water Resources Department
725 Summer Street NE, Suite A
Salem, Oregon 97301-1266
503-986-0900
www.oregon.gov/OWRD

SECTION 1: APPLICANT INFORMATION AND SIGNATURE

Applicant

NAME			PHONE (HM)
City of Geahart			(503) 738-5501
PHONE (WK)	CELL		FAX
(503) 738-5501			
MAILING ADDRESS			
P.O. Box 2510			
CITY	STATE	ZIP	E-MAIL*
Gearhart	OR	97138	chadsweet@cityofgearhart.com

Organization

NAME			PHONE	FAX
City of Gearhart			(503) 738-5501	Received
MAILING ADDRESS				CELL MAY 05 2025
P.O Box 2510				
CITY	STATE	ZIP	E-MAIL*	OWRD
Gearhart	OR	97138	chadsweet@cityofgearhart.com	

Agent – The agent is authorized to represent the applicant in all matters relating to this application.

AGENT / BUSINESS NAME			PHONE	FAX
Chad Sweet - City Administrator			(503) 738-5501	
MAILING ADDRESS				CELL
P.O. Box 2510				
CITY	STATE	ZIP	E-MAIL*	
Gearhart	OR	97138	chadsweet@cityofgearhart.com	

Note: Attach multiple copies as needed

* By providing an e-mail address, consent is given to receive all correspondence from the Department electronically. (Paper copies of the proposed and final order documents will also be mailed.)

By my signature below I confirm that I understand:

- I am asking to use water specifically as described in this application.
- Evaluation of this application will be based on information provided in the application.
- I cannot use water legally until the Water Resources Department issues a permit.
- Oregon law requires that a permit be issued before beginning construction of any proposed well, unless the use is exempt. Acceptance of this application does not guarantee a permit will be issued.
- If I get a permit, I must not waste water.
- If development of the water use is not according to the terms of the permit, the permit can be cancelled.
- The water use must be compatible with local comprehensive land-use plans.
- Even if the Department issues a permit, I may have to stop using water to allow senior water-right holders to get water to which they are entitled.

I (we) affirm that the information contained in this application is true and accurate.

Applicant Signature	Print Name and Title if applicable	Date
[signature]	Chad Sweet - City Administrator	05/02/25
Applicant Signature	Print Name and Title if applicable	Date

For Department Use: App. Number: _____

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SECTION 3: WELL DEVELOPMENT, continued

Total maximum rate requested: 1.5 cfs (each well will be evaluated at the maximum rate unless you indicate well-specific rates and annual volumes in the table below).

The table below must be completed for each source to be evaluated or the application will be returned. If this is an existing well, the information may be found on the applicable well log. *(If a well log is available, please submit it in addition to completing the table.)* If this is a proposed well, or well-modification, consider consulting with a licensed well driller, geologist, or certified water right examiner to obtain the necessary information.

										PROPOSED USE			
OWNER'S WELL NAME OR NO.	PROPOSED	EXISTING	WELL ID (WELL TAG) NO.* OR WELL LOG ID**	FLOWING ARTESIAN	CASING DIAMETER	CASING INTERVALS (IN FEET)	PERFORATED OR SCREENED INTERVALS (IN FEET)	SEAL INTERVALS (IN FEET)	MOST RECENT STATIC WATER LEVEL & DATE (IN FEET)	SOURCE AQUIFER***	TOTAL WELL DEPTH	WELL-SPECIFIC RATE (GPM)	ANNUAL VOLUME (ACRE-FEET)
PW-1	☐	☒	CLAT 53264	☐	10"	0-84	84-114	0-76	1/1/23 - 14.7	Dune Sand	119	125	~78
PW-3	☐	☒	CLAT 53265	☐	10"	0-84	84-114	0-78	1/1/23 - 14.41	Dune Sand	150	100	~78
PW-5	☐	☒	CLAT 53266	☐	10"	0-81	81-112	0-75	1/1/23 - 14.15	Dune Sand	117	200	~78
PW-7	☐	☒	CLAT 53267	☐	10"	0-95	95-125	0-90	1/1/23 - 14.93	Dune Sand	131	200	~78
PW-9	☐	☒	CLAT 53268	☐	10"	0-88	88-118	0-54	1/1/23 - 13.73	Dune Sand	123	260	~78
PW-11	☐	☒	CLAT 53269	☐	10"	0-90	90-121	0-85	1/1/23 - 13.78	Dune Sand	125	200	~78
PW-13	☐	☒	CLAT 53270	☐	10"	0-100	100-152	0-95	1/1/23 - 13.89	Dune Sand	157	350	~78
PW-14	☐	☒	CLAT 53271	☐	10"	0-102	102-154	0-93	1/1/23 - 13.93	Dune Sand	159	280	~78

* Licensed drillers are required to attach a Department-supplied Well Tag, with a unique Well ID or Well Tag Number to all new or newly altered wells. Landowners can request a Well ID for existing wells that do not have one. The Well ID is intended to serve as a unique identification number for each well.

** A well log ID (e.g. MARI 1234) is assigned by the Department to each log in the agency's well log database. A separate well log is required for each subsequent alteration of the well.

*** Source aquifer examples: Troutdale Formation, gravel and sand, alluvium, basalt, bedrock, etc.

SECTION 2: PROPERTY OWNERSHIP

Please indicate if you own all the lands associated with the project from which the water is to be diverted, conveyed, and used.

☐ YES, there are no encumbrances.
☒ YES, the land is encumbered by easements, rights of way, roads or other encumbrances.

☐ NO, I have a recorded easement or written authorization permitting access.
☐ NO, I do not currently have written authorization or easement permitting access.
☐ NO, written authorization or an easement is not necessary, because the only affected lands I do not own are state-owned submersible lands, and this application is for irrigation and/or domestic use only (ORS 274.040).
☐ NO, because water is to be diverted, conveyed, and/or used only on federal lands.

Affected Landowners: List the names and mailing addresses of all owners of any lands that are not owned by the applicant and that are crossed by the proposed ditch, canal or other work, even if the applicant has obtained written authorization or an easement from the owner. *(Attach additional sheets if necessary).*

WATER IS SUPPLIED TO RESIDENTS AND PROPERTIES LOCATED WITHIN THE GEARHART CITY LIMITS AS WELL AS PROPERTIES LOCATED BOTH WITHIN AND BEYOND THE URBAN GROWTH BOUNDARY.

Legal Description: You must provide the legal description of: 1. The property from which the water is to be diverted, 2. Any property crossed by the proposed ditch, canal or other work, and 3. Any property on which the water is to be used as depicted on the map.

SECTION 3: WELL DEVELOPMENT

		IF LESS THAN 1 MILE:	
WELL NO.	NAME OF NEAREST SURFACE WATER	DISTANCE TO NEAREST SURFACE WATER	ELEVATION CHANGE BETWEEN NEAREST SURFACE WATER AND WELL HEAD
1-14	Pacific Ocean	~1,200 feet	~35 feet
1-14	Neacoxie Creek	~2,400 feet	~25 feet

Please provide any information for your existing or proposed well(s) that you believe may be helpful in evaluating your application. For existing wells, describe any previous alteration(s) or repair(s) not documented in the attached well log or other materials *(attach additional sheets if necessary).*

WRD well logs and Water Right Application Map attached

For Department Use: App. Number: _____

SECTION 4: SENSITIVE, THREATENED OR ENDANGERED FISH SPECIES PUBLIC INTEREST INFORMATION

This information must be provided for your application to be accepted as complete. The Water Resources Department will determine whether the proposed use will impair or be detrimental to the public interest with regard to sensitive, threatened or endangered fish species if your proposed groundwater use is determined to have the potential for substantial interference with nearby surface waters.

To answer the following questions, use the map provided in Attachment 3 or the link below to determine whether the proposed point of appropriation (POA) is located in an area where the Upper Columbia, the Lower Columbia, and/or the Statewide public interest rules apply.

For more detailed information, click on the following link and enter the TRSQQ or the Lat/Long of a POA and click on "Submit" to retrieve a report that will show which section, if any, of the rules apply:
https://apps.wrd.state.or.us/apps/misc/lkp_trsqq_features/

If you need help to determine in which area the proposed POA is located, please call the customer service desk at (503) 986-0801.

Upper Columbia - OAR 690-033-0115 thru -0130

Is the well or proposed well located in an area where the Upper Columbia Rules apply?

☐ Yes ☒ No

If yes, you are notified that the Water Resources Department will consult with numerous federal, state, local and tribal governmental entities so it may determine whether the proposed use is consistent with the "Columbia River Basin Fish and Wildlife Program" adopted by the Northwest Power Planning Council in 1994 for the protection and recovery of listed fish species. The application may be denied, heavily conditioned, or if appropriate, mitigation for impacts may be needed to obtain approval for the proposed use.

If yes, and if the Department determines that proposed groundwater use has the potential for substantial interference with nearby surface waters:

- I understand that the permit, if issued, will not allow use during the time period April 15 to September 30, except as provided in OAR 690-033-0140.
- I understand that the Department of Environmental Quality will review my application to determine if the proposed use complies with existing state and federal water quality standards.
- I understand that I will install and maintain water use measurement and recording devices as required by the Water Resources Department, and comply with recording and reporting permit condition requirements.

Lower Columbia - OAR 690-033-0220 thru -0230

Is the well or proposed well located in an area where the Lower Columbia rules apply?

☒ Yes ☐ No

If yes, and the proposed groundwater use is determined to have the potential for substantial interference with nearby surface waters you are notified that the Water Resources Department will determine, by reviewing

recovery plans, the Columbia River Basin Fish and Wildlife Program, and regional restoration programs applicable to threatened or endangered fish species, in coordination with state and federal agencies, as appropriate, whether the proposed use is detrimental to the protection or recovery of a threatened or endangered fish species and whether the use can be conditioned or mitigated to avoid the detriment.

If a permit is issued, it will likely contain conditions to ensure the water use complies with existing state and federal water quality standards; and water use measurement, recording and reporting required by the Water Resources Department. The application may be denied, or if appropriate, mitigation for impacts may be needed to obtain approval of the proposed use.

If yes, you will be required to provide the following information, if applicable.

☒ Yes ☐ No The proposed use is for more than **one** cubic foot per second (448.8 gpm) and is not subject to the requirements of OAR 690, Division 86 (Water Management and Conservation Plans).

If yes, provide a description of the measures to be taken to assure reasonably efficient water use:
Gearhart has submitted a Water Management & Conservation Plan which was approved by the Oregon WRD in April 2023.

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Statewide - OAR 690-033-0330 thru -0340

Is the well or proposed well located in an area where the Statewide rules apply?

☒ Yes ☐ No

If yes, and the proposed groundwater use is determined to have the potential for substantial interference with nearby surface waters you are notified that the Water Resources Department will determine whether the proposed use will occur in an area where endangered, threatened or sensitive fish species are located. If so, the Water Resources Department, Department of Fish and Wildlife, Department of Environmental Quality, and the Department of Agriculture will recommend conditions required to achieve "no loss of essential habitat of threatened and endangered (T&E) fish species," or "no net loss of essential habitat of sensitive (S) fish species." If conditions cannot be identified that meet the standards of no loss of essential T E fish habitat or no net loss of essential S fish habitat, the agencies will recommend denial of the application unless they conclude that the proposed use would not harm the species.

SECTION 5: WATER USE

USE	PERIOD OF USE	ANNUAL VOLUME (ACRE-FEET)
Municipal	July thru October	245 acre-feet

For irrigation use only:
Please indicate the number of primary, supplemental and/or nursery acres to be irrigated (*must match map*).

Primary: Acres Supplemental: Acres Nursery Use: Acres

If you listed supplemental acres, list the Permit or Certificate number of the underlying primary water right(s):

Indicate the maximum total number of acre-feet you expect to use in an irrigation season:

For Department Use: App. Number: _____

- If the use is **municipal or quasi-municipal**, attach **Form M**
- If the use is **domestic**, indicate the number of households: **(Exempt Uses**: Please note that 15,000 gallons per day for single or group **domestic** purposes and 5,000 gallons per day for a single **industrial or commercial** purpose are exempt from permitting requirements.)
- If the use is **mining**, describe what is being mined and the method(s) of extraction (*attach additional sheets if necessary*):

SECTION 6: WATER MANAGEMENT

A. Diversion and Conveyance

What equipment will you use to pump water from your well(s)?

☒ Pump (give horsepower and type): 5hp Submersible
☐ Other means (describe):

Provide a description of the proposed means of diversion, construction, and operation of the diversion works and conveyance of water. Groundwater is conveyed via pipeline to the City of Gearhart Water Treatment Plant. Treated water is then conveyed to Gearhart residences and customers through pipes/pipelines of the Gearhart water distribution and infrastucture system.

B. Application Method

What equipment and method of application will be used? (e.g., drip, wheel line, high-pressure sprinkler) (*attach additional sheets if necessary*)

C. Conservation

Please describe why the amount of water requested is needed and measures you propose to: prevent waste; measure the amount of water diverted; prevent damage to aquatic life and riparian habitat; prevent the discharge of contaminated water to a surface stream; prevent adverse impact to public uses of affected surface waters (*attach additional sheets if necessary*).
Gearhart lacks an adequate and reliable water supply to meet peak seasonal demands during the summer months (July thru October), combined with projected increased demands associated with future population growth.

A Water Management & Conservation Plan has been completed and was approved by Oregon WRD in April 2023.

SECTION 7: PROJECT SCHEDULE

a) Date construction will begin: 2009
b) Date construction will be completed: 2012
c) Date beneficial water use will begin: 2012

SECTION 8: RESOURCE PROTECTION

In granting permission to use water the state encourages, and in some instances requires, careful control of activities that may affect adjacent waterway or streamside area. See instruction guide for a list of possible permit requirements from other agencies. Please indicate any of the practices you plan to undertake to protect water resources.

☒ Water quality will be protected by preventing erosion and run-off of waste or chemical products.

Describe: In accordance with conditions stipulated in the Permt, the City has complied with all of the groundwater and surface water monitoring requirements set forth in the Permit, and will continue to monitor and comply with those conditions in the future.

☒ Excavation or clearing of banks will be kept to a minimum to protect riparian or streamside areas.
Note: If disturbed area is greater than one acre, applicant should contact the Oregon Department of Environmental Quality to determine if a 1200C permit is required.
Describe planned actions and additional permits required for project implementation:

☐ Other state and federal permits or contracts required and to be obtained, if a water right permit is granted:
List:

SECTION 9: WITHIN A DISTRICT

☐ Check here if the point of appropriation (POA) or place of use (POU) are located within or served by an irrigation or other water district.

Irrigation District Name	Address	
City	State	Zip

SECTION 10: REMARKS

Use this space to clarify any information you have provided in the application *(attach additional sheets if necessary).*

Gearhart lacks an adequate and reliable water supply to meet peak seasonal demands during the summer months (July thru September) and future projeted water-use calculations indicate that this water supply deficit will extend into the month of October in coming years.

The City has experienced an approximate 40% increase in population within the last ten years (2014-2024) and, according to Portland State University estimates, will experience an additional 7-10% population growth in the next twenty years.

Gearhart is requesting an additional water right to meet water supply deficits experienced during peak season summer months (Juy though October) and projected increased demands associated with future population growth.

For Department Use: App. Number: _____

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Minimum Requirements Checklist

Minimum Requirements (OAR 690-310-0040, OAR 690-310-0050 & ORS 537.140)

Include this checklist with the application

Check that each of the following items is included. The application will be returned if all required items are not included. If you have questions, please call the Water Rights Customer Service Group at (503) 986-0900.

Please submit the original application and signatures to the Water Resources Department. Applicants are encouraged to keep a copy of the completed application.

- ☒ SECTION 1: Applicant Information and Signature
- ☒ SECTION 2: Property Ownership
- ☒ SECTION 3: Well Development
- ☒ SECTION 4: Sensitive, Threatened or Endangered Fish Species Public Interest Information
- ☒ SECTION 5: Water Use
- ☒ SECTION 6: Water Management
- ☒ SECTION 7: Project Schedule
- ☒ SECTION 8: Resource Protection
- ☐ SECTION 9: Within a District
- ☒ SECTION 10: Remarks

Include the following additional items:

- ☒ Land Use Information Form with approval and signature of local planning department (*must be an original*) or signed receipt.
- ☒ Provide the legal description of: (1) the property from which the water is to be diverted, (2) any property crossed by the proposed ditch, canal or other work, and (3) any property on which the water is to be used as depicted on the map.
- ☒ Fees - Amount enclosed: $
  See the Department's Fee Schedule at www.oregon.gov/owrd or call (503) 986-0900.
- ☒ Map that includes the following items:
  - ☒ Permanent quality and drawn in ink
  - ☒ Even map scale not less than 4" = 1 mile (example: 1" = 400 ft, 1" = 1320 ft, etc.)
  - ☒ North Directional Symbol
  - ☒ Township, Range, Section, Quarter/Quarter, Tax Lots
  - ☒ Reference corner on map
  - ☒ Location of each diversion, by reference to a recognized public land survey corner (distances north/south and east/west)
  - ☒ Indicate the area of use by Quarter/Quarter and tax lot identified clearly.
  - ☐ Number of acres per Quarter/Quarter and hatching to indicate area of use if for primary irrigation, supplemental irrigation, or nursery
  - ☒ Location of main canals, ditches, pipelines or flumes (if well is outside of the area of use)

Water-Use Permit Application Processing

1. **Completeness Determination**

The Department evaluates whether the application and accompanying map contain all of the information required under OAR 690-310-0040 and OAR 690-310-0050. The Department also determines whether the proposed use is prohibited by statute. If the Department determines that the application is incomplete, all fees have not been paid, or the use is prohibited by statute, the application and all fees submitted are returned to the applicant.

2. Initial Review

The Department reviews the application to determine whether water is available during the period requested, whether the proposed use is restricted or limited by rule or statute, and whether other issues may preclude approval of or restrict the proposed use. An Initial Review (IR) containing preliminary determinations is mailed to the applicant. The applicant has 14 days from the mailing date to withdraw the application from further processing and receive a refund of all fees paid minus $310. The applicant may put the application on hold for up to 180 days and may request additional time if necessary.

3. Public Notice

Within 7 days of the mailing of the initial review, the Department gives public notice of the application in the weekly notice published by the Department at www.oregon.gov/owrd. The public comment period is 30 days from publication in the weekly notice.

4. Proposed Final Order Issued

The Department reviews any comments received, including comments from other state agencies related to the protection of sensitive, threatened or endangered fish species. Within 60 days of completion of the IR, the Department issues a Proposed Final Order (PFO) explaining the proposed decision to deny or approve the application. A PFO proposing approval of an application will include a draft permit, and may request additional information or outstanding fees required prior to permit issuance.

5. Public Notice

Within 7 days of issuing the PFO, the Department gives public notice in the weekly notice. Notice includes information about the application and the PFO. Protest must be received by the Department within 45 days after publication of the PFO in the weekly notice. Anyone may file a protest. The protest filing fee is $480.00 for the applicant and $950.00 for non-applicants. Protests are filed on approximately 10 percent of Proposed Final Orders. If a protest is filed the Department will attempt to settle the protest but will schedule a contested case hearing if necessary.

6. Final Order Issued

If no protests are filed, the Department can issue a Final Order within 60 days of the close of the period for receiving protest. If the application is approved, a permit is issued. The permit specifies the details of the authorized use and any terms, limitations or conditions that the Department deems appropriate

Land Use Information Form

OREGON WATER RESOURCES DEPARTMENT
Oregon Water Resources Department
725 Summer Street NE, Suite A
Salem, Oregon 97301-1266
(503) 986-0900
www.oregon.gov/OWRD

Received
MAY 05 2025
OWRD

NOTE TO APPLICANTS

In order for your application to be processed by the Oregon Water Resources Department (OWRD), this Land Use Information Form must be completed by a local government planning official in the jurisdiction(s) where your water right will be diverted, conveyed, used, and developed. The planning official may choose to complete the form while you wait or return the "Receipt Acknowledging Request for Land Use Information" to you. Applications received by OWRD without the Land Use Information Form, or the signed receipt, will be returned to you. **IMPORTANT:** Please note that while OWRD can accept a signed receipt as part of intake for an application for a new permit to use or store water, a completed Land Use Information Form is required for OWRD's acceptance of all other applications. Please be aware that your application cannot be approved without land use approval.

This form is NOT required if:

1) Water is to be diverted, conveyed, and used on federal lands only; **OR**

2) The application is for a water right transfer, allocation of conserved water, exchange, permit amendment, or ground water registration modification, and **all** of the following apply:
   - **a.** The existing and proposed water use is located entirely within lands zoned for exclusive farm-use or within an irrigation district;
   - **b.** The application involves a change in place of use only;
   - **c.** The change does not involve the placement or modification of structures, including but not limited to water diversion, impoundment, distribution facilities, water wells and well houses; **and**
   - **d.** The application involves irrigation water uses only.

NOTE TO LOCAL GOVERNMENTS

The person presenting the attached Land Use Information Form is applying for a new water right or modifying an existing water right. The Oregon Water Resources Department (OWRD) requires applicants to obtain land use information to ensure the water right does not result in land uses that are incompatible with your comprehensive plan. Please complete the form and return it to the applicant for inclusion in their application. **NOTE:** For new water right applications only, if you are unable to complete this form while the applicant waits, you may complete the "Receipt Acknowledging Request for Land Use Information" and return it to the applicant.

You will receive notice via OWRD's weekly Public Notice once the applicant formally submits their request to OWRD. The notice will give more information about OWRD's water right process and provide additional comment opportunities. If you previously only completed the receipt for an application for a new permit to use or store water, you will have 30 days from the Public Notice date to complete the Land Use Information Form and return it to OWRD. Your attention to this request for information is greatly appreciated. If you have questions concerning this form, please contact OWRD's Customer Service Group at 503-986-0900 or WRD_DL_customerservice@water.oregon.gov.

Land Use Information Form

OREGON WATER RESOURCES DEPARTMENT
Oregon Water Resources Department
725 Summer Street NE, Suite A
Salem, Oregon 97301-1266
(503) 986-0900
www.oregon.gov/OWRD

Received
MAY 05 2025
OWRD

NAME			PHONE
City of Gearhart			(503) 738-5501
MAILING ADDRESS			
P.O. Box 2510			
CITY	STATE	ZIP	EMAIL
Gearhart	OR	97138	chadsweet@cityofgearhart.com

A. Land and Location

Please include the following information for all tax lots where water will be diverted (taken from its source), conveyed (transported), and/or used or developed. Applicants for municipal use, or irrigation uses within irrigation districts, may substitute existing and proposed service-area boundaries for the tax-lot information requested below.

Township	Range	Section	¼ ¼	Tax Lot #	Plan Designation (e.g., Rural Residential/RR-5)	Water to be:	Proposed Land Use:
6N	10W	4 & 9		100	Park (P-1)	☒ Diverted ☐ Conveyed ☐ Used	Park (P-1)
6N	10W	3,4,9, 10			Various	☐ Diverted ☐ Conveyed ☒ Used	No Changes
7N	10W	33,34			Various	☐ Diverted ☐ Conveyed ☒ Used	No Changes
						☐ Diverted ☐ Conveyed ☐ Used	

List all counties and cities where water is proposed to be diverted, conveyed, and/or used or developed:

All water uses, diversions and conveyences are located within Clatsop County.
See Attached Water Right Application Map.

NOTE: A separate Land Use Information Form must be completed and submitted for each county and city, as applicable.

B. Description of Proposed Use

Type of application to be filed with the Oregon Water Resources Department:

☒ Permit to Use or Store Water ☐ Water Right Transfer ☐ Permit Amendment or Ground Water Registration Modification
☐ Limited Water Use License ☐ Exchange of Water ☐ Allocation of Conserved Water

Source of water: ☐ Reservoir/Pond ☒ Ground Water ☐ Surface Water (name) _____

Estimated quantity of water needed: 1.5 ☒ cubic feet per second ☐ gallons per minute ☐ acre-feet

Intended use of water: ☐ Irrigation ☐ Commercial ☐ Industrial ☐ Domestic for _____ household(s)
☒ Municipal ☐ Quasi-Municipal ☐ Instream ☐ Other _____

Briefly describe:

Gearhart is requesting additionnal water to meet peak, seasonal water demands and projected future population growth.

Note to applicant: For new water right applications only, if the Land Use Information Form cannot be completed while you wait, please have a local government representative sign the receipt on the bottom of page 4 and include it with the application filed with the Oregon Water Resources Department.

See Page 4 →

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For Local Government Use Only

The following section must be completed by a planning official from each county and city listed unless the project will be located entirely within the city limits. In that case, only the city planning agency must complete this form. This deals only with the local land use plan. Do not include approval for activities such as building or grading permits.

Please check the appropriate box below and provide the requested information

☒ Land uses to be served by the proposed water use(s), including proposed construction, are allowed outright or are not regulated by your comprehensive plan. Cite applicable ordinance section(s): PROPOSAL IS TO EXPAND WATER RIGHTS ONLY, NO BOUNDARY EXPANSION; NOT REQ'D BY COMP. PLAN

☐ Land uses to be served by the proposed water use(s), including proposed construction, involve discretionary land-use approvals as listed in the table below. (Please attach documentation of applicable land-use approvals which have already been obtained. Record of Action/land-use decision and accompanying findings are sufficient.) **If approvals have been obtained but all appeal periods have not ended, check "Being Pursued."**

Type of Land-Use Approval Needed (e.g., plan amendments, rezones, conditional-use permits, etc.)	Cite Most Significant, Applicable Plan Policies & Ordinance Section References	Land-Use Approval:
		☐ Obtained ☐ Being Pursued ☐ Denied ☐ Not Being Pursued
	Received MAY 05 2025 OWRD	☐ Obtained ☐ Being Pursued ☐ Denied ☐ Not Being Pursued
		☐ Obtained ☐ Being Pursued ☐ Denied ☐ Not Being Pursued
		☐ Obtained ☐ Being Pursued ☐ Denied ☐ Not Being Pursued

Local governments are invited to express special land use concerns or make recommendations to the Oregon Water Resources Department regarding this proposed use of water in the box below or on a separate sheet.

NEACOXIE CREEK IS A GOAL 17 WETLAND.

Name: GAIL HENRIKSON Title: COMM. DEV. DIR.

Signature: GAIL HENRIKSON Date: 4-16-25

Governmental Entity: CLATSOP COUNTY Phone: 503-325-8611

Receipt Acknowledging Request for Land Use Information

Note to Local Government Representative:
Please complete this form and return it to the applicant. **For new water right applications only**, if you are unable to complete this form while the applicant waits, you may complete this receipt and return it to the applicant. If you sign the receipt, you will have 30 days from the date of OWRD's Public Notice of the application to submit the completed Land Use Information Form to Oregon Water Resources Department. Please note while OWRD can accept a signed receipt as part of intake for an application for a new permit to use or store water, a completed Land Use Information Form is required for all other applications.

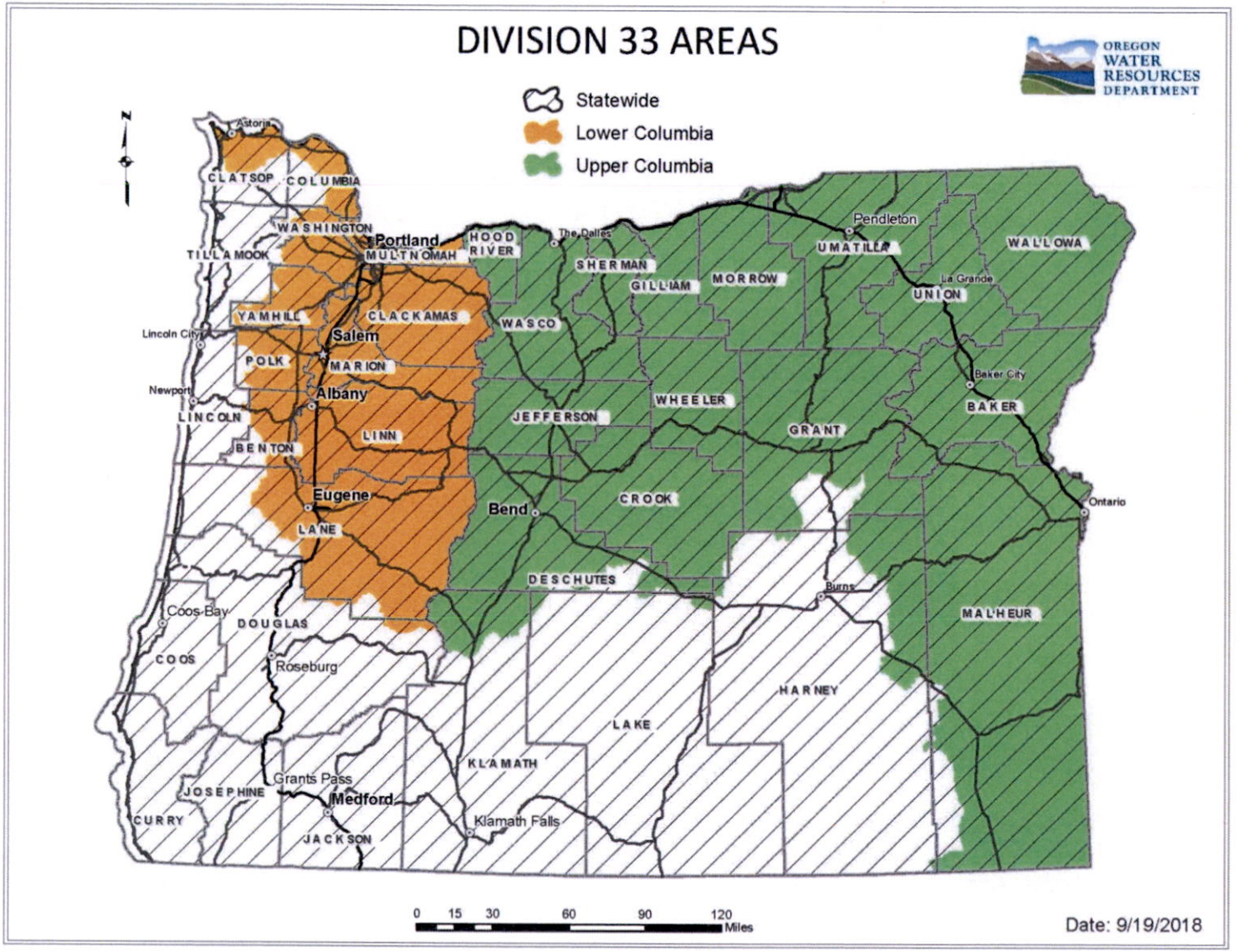
Applicant Name: _____

Staff Name: _____ Title: _____

Staff Signature: _____ Date: _____

Governmental Entity: _____ Phone: _____

Figure 1: Map of Division 33 Areas



For more detailed information, click on the following link and enter the TRSQQ or the Lat/Long of a POA and click on "Submit" to retrieve a report that will show which section, if any, of the Division 33 rules apply: https://apps.wrd.state.or.us/apps/misc/lkp_trsqq_features/

April 14, 2025

TECHNICAL MEMORANDUM

To: Oregon Water Resources Dept.
Water Rights Division

From: Chris Hyatt, RG, LHG – Senior Geologist/Hydrogeologist, Hyatt GeoSciences, LLC
Michael Maley, PE, PG, CHG – Principal Hydrogeologist, Todd Groundwater

Cc: Chad Sweet – Gearhart City Administrator
Mark McFadden – Gearhart Public Works Director

RE: CITY OF GEARHART, OREGON
Groundwater Rights Application
OWRD Application G-19486

This technical memorandum is being submitted in combination with the City of Gearhart's water right application (G-19486) to support the City's application package and to provide the Oregon Water Resources Department (OWRD) with background information and supporting analyses to address concerns regarding potential saltwater intrusion and impacts to surface water flows in Neacoxie Creek.

Previous discussions with OWRD personnel have indicated that obtaining a new/additional water right may be difficult due to concerns over surface water flows and saltwater intrusion. However, WRD correspondence to Hyatt GeoSciences, LLC (HGS) dated December 19, 2023, states that "*If the City decides to apply for an additional groundwater permit, we recommend preparing a robust application package that includes much of the more-recently acquired information, specifically that which addresses the saltwater intrusion and stream depletion concerns. Data and/or model results that can be used to provide quantified estimates of key groundwater budget elements (e.g., primary source of groundwater to the wellfield, impacts to flows in Neacoxie Creek (and potentially other streams)) would be particularly supportive of a new groundwater permit application.*"

The City is submitting this application package requesting additional water supply to meet existing and projected water demands through 2045. Specifically, the City is seeking to obtain an additional water right for the period of July through October of each year to supplement the water supply shortfall created under the existing OWRD Permit.

PROJECT BACKGROUND

The City of Gearhart (City) utilizes groundwater and wholesale water purchased from the City of Warrenton as a supplemental source to meet seasonal high water demands. Water is appropriated via eight water supply production wells (Figure 1). Six monitoring wells are used for measuring groundwater quality and/or groundwater elevations. A surface water gauging station in Neacoxie Creek, located east of the wellfield, is used to monitor stream stage and several water quality parameters.

Current OWRD Permit

The City obtained OWRD Permit G-16390 (the Permit) in November 2008, allowing the City to appropriate groundwater for municipal use. The City began appropriating water in July 2012. The Permit allows the City to appropriate a maximum flow rate of 2.18 cubic feet per second (cfs) or approximately 42.3 million

gallons per month (MGM) from November through June each year. However, maximum allowable pumping rates are reduced to between 0.289 cfs (5.8 MGM) and 0.485 cfs (9.7 MGM) from July through October.

The existing Permit is heavily conditioned due to concerns over potential saltwater intrusion and impacts to flows in Neacoxie Creek. As part of the Permit conditions, six monitoring wells are used for measuring local groundwater quality and/or groundwater elevations. A surface water gauging station was also established in Neacoxie Creek which is used to monitor stream stages and several additional water quality parameters. The City has implemented and complied with the conditions set forth in the Permit's Monitoring and Action from 2012 to present. To date, there have been no exceedances or inadequacies to the requirements and conditions specified in the Permit.

The City's current permit allows for sufficient flow to meet water demand from January through June each year. However, the Permit curtails the flow rate allowed for the months of July through October each year when population and water use demands are at their peak. This seasonal limitation of flow results in the City needing to purchase treated water from the nearby City of Warrenton, Oregon.

The City has also experienced an unexpected growth in the residential population over the past several years which has put added stress on the City's water system. The increase in population, along with future planned residential developments, has led the City to realize that additional capacity will be required to meet future water demands.

Current Supplemental Water Supply

In accordance with the Permit, the City maintains a physical connection to the water systems of the City of Warrenton, Oregon and Seaside, Orgon to ensure adequate water supply and to supplement water supply during the summer months when the Permit restricts groundwater pumping rates.

Gearhart and Warrenton have maintained a Mutual Organization Understanding (MOU) for Warrenton to provide supplemental water since the Permit was originally issued in 2008. Warrenton recently approved a revised water MOU with Gearhart for a limited period of 2-3 years. Although Gearhart and Warrenton currently have an existing MOU, Warrenton has indicated that future planned residential developments within Warrenton along with anticipated population growth, will severely limit Warrenton's ability to be a reliable water source to Gearhart in the future.

The City's goals of obtaining additional water supply are based primarily on necessity and reliability, but also economics and independence. The City imports approximately 30 million gallons of treated water from Warrenton every year. The City would enjoy the cost benefits of having its own independent and reliable water source during the summer months when water demands are highest.

Water Conservation Measures

The City submitted the required Water Management and Conservation Plan (WMCP) to OWRD in August 2023. As a result of increased demand experienced over this past summer, the City recently implemented Stage 1 of the WMCP which informs residents of the potential for a water shortage and the need for voluntary reductions in consumption by all water users.

The City has also recently revised its water rate schedule and structure. This update encompasses increased "basic" water usage rates and introduces a rate multiplier for high consumption water users. These conservation measures are intended to decrease public water demands and promote responsible water usage.

Future Population and Water Demand Projections

Gearhart has experienced unexpected growth in the residential population over the past several years which has put added stress on the City's water system. As outlined in the 2023 Water Management and Conservation Plan (GSI, 2023), Gearhart projected its future population growth by applying an annual average growth rate (AAGR) to its existing population. The AAGR was calculated using historical population data within City limits from 2010 to 2020 published by the U.S. Census Bureau. The City calculated an AAGR of 2.26%. The AAGR was then applied to the population estimate for the entire service area of 2,493 in 2021 to arrive at the 20-year projected population estimate for 2045 as shown in Figure 2.

By 2045, the City's service area population is projected to reach 4,262 people. This estimate assumes that the population located outside of City limits (estimated at 700 in 2021) that receives City water service increases at the same rate as the population located within the City limits. This increase in population, along with future planned residential developments, has led the City to realize that additional capacity will be required to meet future water demands.

Tables 1 and 2 provide a comparison of water demand to the current OWRD permit allowances for Gearhart's 2023 monthly water demand and 2045 monthly projected water demand, respectively. The population AAGR of 2.26% was applied to the 20-year projected water consumption/demand from 2023 through 2045 to calculate the projected water demand. This is considered a conservative assumption by assuming no future improvements in water conservation by the City. Figure 3 provides a graphical illustration of the comparison of Gearhart's 2023 water demand to the 2024 Projected Water Demand.

Table 1 – Gearhart 2023 Water Demand and ORWD Permit Allowance

Month	2023 Demand (gal)	(cfs)	ORWD Permit Allowance (gal)	(cfs)	Surplus/Deficit (gal)	(cfs)
January-23	5,209,329	0.26	43,675,062	2.18	38,465,733	1.92
February-23	5,022,862	0.28	39,448,443	2.18	34,425,581	1.90
March-23	5,799,061	0.29	43,675,062	2.18	37,876,001	1.89
April-23	5,755,926	0.30	42,266,189	2.18	36,510,263	1.88
May-23	12,935,778	0.65	43,675,062	2.18	30,739,284	1.53
June-23	17,855,717	0.92	42,266,189	2.18	24,410,472	1.26
July-23	19,889,336	0.993	8,875,253	0.443	(11,014,083)	(0.55)
August-23	18,853,878	0.941	5,789,951	0.289	(13,063,927)	(0.67)
September-23	13,539,593	0.70	7,949,146	0.41	(5,590,447)	(0.29)
October-23	7,521,681	0.375	9,716,700	0.485	2,195,019	0.11
November-23	6,167,180	0.32	42,266,189	2.0	36,099,009	1.86
December-23	6,062,309	0.30	43,675,062	2.18	37,612,753	1.88
TOTAL	**124,512,650**	**6.32**	**373,278,306**	**18.89**		

Table 2 – Gearhart 2045 Projected Water Demand and ORWD Permit Allowance

Month	2023 Demand (gal)	(cfs)	ORWD Permit Allowance (gal)	(cfs)	Surplus/Deficit (gal)	(cfs)
January-45	9,883,773	0.49	43,675,062	2.18	33,791,288	1.69
February-45	8,357,558	0.46	39,448,443	2.18	31,090,884	1.72
March-45	12,124,519	0.61	43,675,062	2.18	31,550,542	1.57
April-45	11,746,579	0.61	42,266,189	2.18	30,519,609	1.57
May-45	17,418,161	0.87	43,675,062	2.18	26,256,901	1.31
June-45	24,122,686	1.25	42,266,189	2.18	18,143,503	0.93
July-45	29,133,809	1.46	8,875,253	0.443	(20,258,556)	(1.01)
August-45	30,842,790	1.54	5,789,951	0.289	(25,052,840)	(1.25)
September-45	22,193,530	1.15	7,949,146	0.41	(14,244,385)	(0.74)
October-45	17,023,406	0.85	9,716,700	0.485	(7,306,706)	(0.37)
November-45	10,737,059	0.55	42,266,189	2.0	31,529,130	1.45
December-45	10,795,640	0.54	43,675,062	2.18	32,879,421	1.64
TOTAL	**204,379,512**	**10.38**	**373,278,306**	**18.89**		

As shown in Figure 3, the City, under the current OWRD water right permit, experienced a water supply shortage during the high-demand months of July, August and September of between 5.6 MG and 13 MG in 2023. By 2045 that deficit is projected to increase to between 7.5 and 25 MG. In consideration of the above factors, the City is seeking to obtain an additional water right for the period of July through October of each year to supplement the water supply shortfall created under the existing OWRD Permit.

Water Supply Options

Moving forward, the City needs a reliable water source, particularly during high demand summer months, which is not dependent on supplemental sources of water. As outlined below, it is estimated that an additional 1.0 to 1.5 cfs will be required to meet both current and future water demands during the summer months. While obtaining an additional OWRD water right permit would be the least costly and most time-efficient option, several alternative water supply options have been considered.

Aquifer storage (AS) and aquifer storage and recovery (ASR) are two options that have been considered. However, assembling the necessary elements of an AS/ASR system would prove difficult due to the lack of a viable surface water source in the immediate area. The existing water treatment facility would also require significant upgrades to comply with the more stringent surface water treatment requirements. Similarly, excessive treatment and infrastructure costs associated with desalination make that option cost prohibitive.

Increased storage capacity such as additional above ground storage tanks has been considered. However, as identified in Table 2, the quantity of water required to meet the anticipated future water demand (7.5 to 25 MG) during the summer months excludes it as a feasible alternative.

A water right transfer, wherein an existing groundwater right located nearby and within the North Coast Basin is transferred or partially transferred to the City, is a viable and cost-effective option which the City has investigated. This option would require that any water right being transferred draw groundwater from a similar source or aquifer (point of diversion) and be specified for a similar type and quantity of use. There may be water rights in the area that may be up for cancellation or forfeiture due to lack of use, however,

the absence of any centralized information base or clearinghouse has made identifying viable candidates for a potential water right transfer difficult.

Expanded Permit Application

Because a suitable alternative is not available or feasible, the City is moving forward with a request to ORWD for an additional water right for the period of July through October of each year to supplement the water supply shortfall created under the existing OWRD Permit.

Todd Groundwater prepared the following groundwater model to demonstrate any potential for saltwater intrusion and/or impacts to Neacoxie Creek resulting from increasing groundwater pumping rates during the high-demand summer months each year.

HYDROGEOLOGICAL CONCEPTUAL MODEL

The hydrogeological conceptual model provides a description of the regional geology, hydrology, and groundwater conditions for the Gearhart area. The geology and groundwater conditions are based on an earlier study of the groundwater resources of the Clatsop Plains sand-dune aquifer by Frank (1970) and supplemented groundwater level and water quality data collected under Permit G-16390 by the City since 2014. The surface water hydrology includes characterization of the Necanicum River Estuary and its tributaries of Neacoxie and Neawanna Creeks from the Oregon Estuary Plan Book produced by the Oregon Department of Land Conservation and Development (Cortright and others, 1987).

Physical Setting

The City of Gearhart is located on the Clatsop Plains, an area of lowlands along the Pacific Coast that are composed of extensive sand dune and beach sand deposits (Figure 4). The aquifer extends offshore where it is directly overlain by the Pacific Ocean. The sand-dune area consists of a series of undulating ridges that slope upward from the ocean to the base of the bedrock foothills. Areas of swamp and bog forest are extensive and in places form strips between minor ridges, particularly at the north end and on the east side of the dune area (Frank, 1970). The highest points of the dune ridges in the Gearhart area reach elevations of just over 50 feet.

Necanicum River Estuary is the primary hydrologic feature in this area (Figure 4). An estuary is defined as a semi-enclosed body of water, connected to the ocean, where salt water is measurably diluted with fresh water from the land. It is a zone of transition between the marine-dominated systems of the ocean and the upland river systems that form a distinctive estuarine habitat. Neacoxie Creek and other smaller surface-water drainages form the main surface water drainage in the Gearhart area but experience strong tidal influences up to a mile inland.

Groundwater Conditions

The Clatsop Plains are underlain by extensive sand dune and beach sand deposits of Pleistocene and Holocene age overlying the eroded surface of the Tertiary Astoria Formation (Frank 1970). The thickness of the sand dune deposits is about 75 to 150 feet, based Frank (1970) and well logs from the City of Gearhart production and monitoring wells. Figure 5 provides a regional cross section across the Clatsop Plains just north of Gearhart. The sand dune deposits form the principal water-bearing aquifer in the area. The underlying Astoria Formation consists of a thick sequence of fine-grained, tightly compacted sandstones and siltstones that have low permeability and yield only small quantities of groundwater (Frank, 1970). However, basalt associated with the Columbia River Basalt Group (CRBG) was encountered at the terminal depths of several of the boreholes for the Gearhart production wells.

The regional water table contours closely correspond to the shape of the land-surface features (Frank, 1970). The highest groundwater elevations generally follow the shape and topography of sand dune ridges. From these ridges, the groundwater gradient slopes downward towards the Pacific Ocean on the west and towards Neacoxie Creek and other smaller surface-water drainages to the east (Figure 5). Lowest groundwater levels are observed along the ocean, but localized lows converge towards Neacoxie Creek. Based on the groundwater elevation map (Figure 5), groundwater discharge is primarily as seeps and underflow to the Pacific Ocean, but localized discharges occur to local surface drainages including Neacoxie Creek.

The average rainfall in the Gearhart area is about 76 inches per year based on weather records from the City of Seaside since 1930 (Figure 6, WRCC, 2025). The groundwater elevations in the dune sand aquifer fluctuates seasonally in direct response to the amount of precipitation recharge. Precipitation in the area is least in July and August and greatest in December and January. During the high rainfall months, the dune sand rapidly absorbs and stores water from precipitation. Frank (1970) estimated that 80% of the precipitation infiltrates into the dune sands.

The dune-sand aquifer is highly permeable and absorbs and stores, as fresh water, a large percentage of the annual precipitation. Frank (1970) estimated that the dune-sand aquifer could yield 2,500 acre-feet per year of groundwater per square mile of area without adverse effects. This is equivalent to 3.5 cfs per or 68 MG/m per square mile, which exceeds the projected water supply needs for the City.

The hydrographs from the Gearhart monitoring wells (Figure 7) demonstrate the seasonal variability in the groundwater elevations in the dune sand aquifer. During the typically wet months of November through March, groundwater elevations rise by 3 to 8 feet in direct response to precipitation. As precipitation begins to decrease in the late spring and summer, groundwater elevations decline by 3 to 8 feet from April through October. The peak annual groundwater elevation typically occurs in the early spring months, and that peak will vary in direct response to the total precipitation in that year. The lowest groundwater elevations occur in late summer or early autumn before the first significant rainfall.

The regional groundwater flow pattern is illustrated in Figure 8. The dune sand aquifer is primarily recharged by rapid percolation of precipitation that falls on the sand dune deposits. In general, higher groundwater elevations develop under the higher dunes. As a result, the dunes act as storage areas where these higher groundwater elevations provide the driving head for groundwater flow to the discharge areas. Groundwater in the Gearhart area discharges primarily as seeps and underflow to the Pacific Ocean, but minor amounts of groundwater also discharge locally to primary drainages such as Neacoxie Creek (Frank, 1970).

Groundwater-Surface Water Interactions - Pacific Ocean

Seawater intrusion is the movement of saline water from an ocean or bay into a freshwater aquifer. Some degree of seawater intrusion occurs in virtually all coastal aquifers, as long as they are hydraulically connected with seawater. Because freshwater is less dense than seawater, it floats on top of the saline water when both are present in an aquifer. Under a simplified aquifer system with groundwater flowing toward the ocean, the seawater-freshwater interface gets progressively closer to the ground surface moving to the ocean with this shape being termed the "saltwater wedge". The saltwater-freshwater interface is not actually a sharp interface because of the action of dispersion and diffusion, instead forming a transition zone where chloride concentrations range from values typical of freshwater to those of seawater (Bear and others, 1999).

The location of the seawater-freshwater interface is dependent upon the relative difference in groundwater pressure, or head, which takes into account both the elevation and density differences

between seawater and freshwater in the aquifer. Due to its high salt content, seawater has a density of about 2.6% higher than freshwater. Based on this difference in densities, the Ghyben-Herzberg principle states that, for every foot of freshwater head in an unconfined aquifer above sea level, there will be 40 feet of fresh water in the aquifer below sea level at equilibrium (Todd and Mays, 2004, Bear and others, 1999; Freeze and Cherry, 1979).

Permit G-16390 includes a provision that the groundwater elevations in the foredune monitoring wells are not to decline below the referenced 3-foot vertical datum (North American Vertical Datum of 1988 (NAVD88)) to minimize the potential for landward migration of saline water. Following the Ghyben–Herzberg principle, this 3-foot elevation (NAVD88) indicates that freshwater extends to an elevation of -120 feet (NAVD88), which is essentially at the base of the dune aquifer.

In addition, Section 2 of the Permit requires that background concentrations for both total dissolved solids (TDS) and chloride be established to monitor the potential of saltwater intrusion into the shallow aquifer, and a 20 percent exceedance value be calculated based on the established background concentrations. These values were previously calculated through a statistical analysis of pre-pumping and post-pumping water quality data, as described in SoundEarth's February 2013 compliance report (SoundEarth 2014, 2023). The calculated background and exceedance values are as follows:

- The background concentration for TDS was established at 456 milligrams per liter (mg/L), with a 20 percent exceedance value of 547 mg/L.
- The background concentration for chloride was established at 127 mg/L, with a 20 percent exceedance value of 152 mg/L.

The hydrographs in Figure 9 provide groundwater elevation, TDS and chloride concentration data for the three active foredune monitoring wells (MW-1A, MW-2A, and MW-3). The five foredune monitoring wells (MW-1, MW-1A, MW-2, MW-2A, and MW-3) are located between the Gearhart production wells and the Pacific Ocean. From 2008 to 2023 groundwater elevations in all five of these wells typically varied between 9 and 17 feet (NAVD88). This is well above the 3-foot vertical datum (NAVD88) required by the permit and indicates that freshwater conditions occur throughout the aquifer at these locations. The TDS and chloride concentrations in all three active monitoring wells have remained below the calculated exceedance concentrations since monitoring began in 2014. Furthermore, TDS and chloride concentrations have remained stable or show a slight decreasing trend over time. This may be occurring because the pumping wells are pulling in more freshwater from the inland dune areas.

Pumping from the freshwater aquifer lowers the groundwater head in that aquifer which can allow the saltwater-freshwater interface to migrate inland. If the groundwater levels rise again, the saltwater-freshwater interface would migrate back seaward. Movement of the saltwater-freshwater interface is a slow process. For a significant migration of the saltwater wedge to occur, the conditions leading to seawater intrusion must be continuously sustained for an extended period on the order of several years.

Groundwater-Surface Water Interactions – Neacoxie Creek and Necanicum River Estuary

The Necanicum River Estuary is characterized as a drowned-river mouth type estuary (Cortright and others, 1987). This type of estuary is characterized by high winter flood discharge with high volumes of sediments through the estuary. In summer, however, seawater inflow dominates because streamflow is low.

The Oregon Estuary Plan Book (Oregon DLCD, 1987) characterizes four major subsystems as shown in the drawing on Figure 10. At the mouth of the estuary, daily tide brings the marine environment (marine

subsystem) into the estuary (bay subsystem). The bay is dominated by broad tidal flats of mud and sand that will be covered by water at high tide. The slough subsystem occurs where small, generally low flowing tributary streams fringed with salt marshes make their way toward the bay. The sloughs are also tidally influenced with daily surging high tides bringing marine conditions inland along the stream. The riverine subsystem dominates where the river flows from the mountains into the estuary as a single channel that meanders through marshlands.

A map of the estuarine habitat distribution within the Necanicum River Estuary is provided in Figure 11 (Cortright and others, 1987). The bay area of the Necanicum River Estuary experiences daily mixed semidiurnal tides that consist of two high and two low tides of different sizes every lunar day. As a result, the bay portion of the estuary is flooded with seawater during high tides and the sand is exposed during low tides. Neacoxie Creek is a tributary stream to the overall estuary.

Neacoxie Creek is a slough, or smaller tributary, to the main bay and flows from Sunset Lake to the north across the sand deposits in the Gearhart area. Figure 11 shows that Neacoxie Creek is fringed with salt marsh habitats due to tidal influences that extend up to one mile inland from where it flows into the estuary bay (Cortright and others, 1987). Sloughs are characterized by daily tidal flushing; however, in this area it may not be as complete as in parts of the estuary that are closer to the ocean or main channel. Generally, sloughs consist of meandering channels that wind through fringing salt marshes and across mud flats to the main bay. Above the tidal marsh area, Neacoxie Creek becomes more of a riverine habitat that is confined in a narrow channel. However, this is the area where the tide begins to affect the flow of the stream.

The monitoring network for collecting data under Permit G-16390 by the City includes a surface water monitoring station at SW-MS1 at Neacoxie Creek where it crosses Pacific Way. Figure 12 provides a general map that characterizes the tidal influences within the Necanicum Estuary and Neacoxie Creek in the Gearhart area. These are confirmed by data provided on two graphs (Figure 13) comparing the surface water elevation and the TDS concentration at the SW-MS1 station over a two-year period (upper) and a 4-month period from July through October. These graphs clearly show the tidal effects in Neacoxie Creek. The surface elevation data shows that the tidal effects are observed daily at SW-MS1 with surface water elevations varying between 1 to 4 feet every day. The TDS concentration data shows that saltwater reaches SW-MS1 with TDS concentrations varying from about 100 mg/L to over 25,000 mg/L over short periods of time. The SW-MS1 data shows, based on TDS concentrations, that Neacoxie Creek experiences freshwater conditions about 60% of the time, brackish water conditions about 20% of the time, and marine saltwater conditions about 20% of the time. This is consistent with the salt marsh environment (Cortright and others, 1987) shown in Figure 8. During low streamflow conditions, such as during the period from July through October, tidal effects are the predominant influence on stream flow in Neacoxie Creek.

Limited stream flow data are available for Neacoxie Creek. Frank (1970) reported streamflow in Neacoxie Creek measured at a point about 1 mile south of the outlet of Sunset Lake (Figure 3) and at the bridge on Gearhart Avenue (Figure 12) which is located 1.5 miles farther downstream and about 0.75 miles north of SW-MS1. Measurements made at these two points on February 1967 show a 5.4 cfs increase in flow downstream from 11.1 to 16.5 cfs. Measurements made at the same points on April 10, 1967, show an increase in flow downstream of 5.09 cfs, from 8.71 to 13.8 cfs (Frank, 1970). The 5.09 to 5.4 cfs change in flow is inferred to represent tidal influences. The tidal influence would be even greater further downstream at SW-MS1.

Frank (1970) described that most streams in the Clatsop Plains act as groundwater drains, meaning groundwater will flow into the stream beds. The lack of well-defined channels tributary to the streams is evidence that very little precipitation leaves the dune area by direct runoff. Water runs off the surface of

the sand only when rainfall exceeds the intake capacity of the sand or when the sand is saturated to the land surface. Normally, the water table is higher than the stream levels, and water discharges from the ground-water body to the streams. Neacoxie Creek receives ground-water discharge throughout the year, and its flow increases progressively in a downstream direction (Frank, 1970).

The interaction between streams and groundwater is dependent upon the relative difference in the elevation, or stage, or the stream and the elevation of the groundwater in the vicinity of the stream. If groundwater elevations are higher than the stage of the stream, then groundwater discharges to the stream. Conversely, if groundwater elevations are lower than the stage of the stream, the water from the stream discharges to the groundwater. Figure 14 compares the surface water elevations in Neacoxie Creek (SW-MS1) with the groundwater elevations in MW-6. MW-6 is a shallow well located about 250 feet east of the Neacoxie Creek and completed just below the depth of the creek. This comparison shows that MW-6 consistently maintains groundwater elevations above Neacoxie Creek; therefore, it can be inferred that Neacoxie Creek in this area would be characterized as a gaining stream where groundwater consistently discharges to the stream.

The seepage rate between a lakebed or streambed and the groundwater system is controlled by the permeability of the subsurface geology and the thickness and character of the streambed or lakebed. If the sediments at the bottom of the lake or stream are composed of clayey materials, then the rate of seepage may be low and the levels in the surface water body may not be in equilibrium with groundwater. Conversely, if the lake or stream has a sandy bottom, then the rate of seepage may be high, and the groundwater levels may closely mimic the surface water.

GROUNDWATER FLOW MODEL

Using the updated groundwater flow model, model scenarios were developed to evaluate the potential impacts of the increased pumping capacity requested by OWRD. The primary objectives are to support the City's request for additional water rights and to evaluate a range of potential wellfield pumping scenarios to assess the potential impacts of wellfield operations on the following:

- Groundwater interactions with Neacoxie Creek,
- Groundwater interactions with the Pacific Ocean, and
- Influence of seasonal variations of groundwater, creek levels, and pumping.

To do this, the five-layer MODFLOW model used for the previous water rights application was updated.

Model Setup

The updated groundwater flow model for the City of Gearhart utilizes the groundwater modeling code MODFLOW 2005 (Harbaugh and others, 2005). The model is an updated and recalibrated version of the model used for the previous water rights application prepared for the City. MODPATH was used to calculate the groundwater flow lines to determine the source area of the groundwater extracted by the Gearhart production wells.

The Gearhart Model covers about 2.6 square miles of the City of Gearhart and surrounding areas that include 0.84 square miles of the sand dune aquifer overlain by the Pacific Ocean. The model consists of the following:

- Model simulation grid consists of 410 rows and 365 columns using a uniform grid spacing of 22 feet.

- The model simulation grid contains 748,250 model cells of which 502,517 cells active in each simulation.
- The model calibration consists of 180 monthly stress periods to simulate the period from October 1, 2008, through September 30, 2023.

A grid-spacing of 22 feet provides sufficient spatial resolution to simulate the interactions with Neacoxie Creek and the Pacific Ocean. The use of monthly stress periods provides the temporal resolution so that the effects of monthly variations in pumping, recharge and other parameters can be evaluated with respect to the interactions with Neacoxie Creek and the Pacific Ocean

The model includes multiple boundary conditions to simulate inflows and outflows from the model to represent groundwater interactions from surface features or aquifer areas beyond the model domain. Several of these boundary conditions, including the Pacific Ocean, Neacoxie Creek, Necanicum River Estuary, local drainages, and subsurface groundwater flow with areas outside of the model domain, are shown in Figure 15 and discussed in more detail below.

The model was constructed with 5 model layers to provide sufficient resolution to evaluate vertical groundwater gradients within the aquifer as shown on Figure 16. Model Layer 1 represents the Pacific Ocean, whereas Model Layers 2, 3, 4 and 5 are subdivisions of the sand dune aquifer to provide resolution to evaluate vertical gradient within the aquifer. The upper surface of the model represents the topography whereas the lower surface of the model is based on a uniform slope that conforms to bedrock from borehole data from the Gearhart wells and the conceptual model of Frank (1970).

The groundwater model requires accurate surface elevations to properly reflect various hydrologic and hydrogeologic processes. The model was updated with a digital elevation model (DEM) for the Seaside, OR coastal region (Venturator, 2005) to ensure the surface layer of the model is representative of the region's topography. The DEM was based on LiDAR data for the Seaside-Gearhart area and included bathymetric data for the Pacific Ocean seafloor. This DEM (Venturator, 2005) references mean high water (MHW) as its vertical datum. We adjusted this DEM to the NAVD88 Datum by adding 7.0 ft – the approximate difference between MHW and NAVD88 datums obtained from nearby coastal NOAA tide gauge stations at Tillamook Bay, Oregon and Cape Disappointment, Washington. The elevation datum used for the Gearhart groundwater model is the North American Vertical Datum of 1988 (NAVD88).

Groundwater Pumping

Water demand by the City is highly seasonal and reflects seasonal population trends. Population and water demand are typically highest in the summer and decrease in the winter months. Table 3 provides the monthly water supply data for the City in 2023. Monthly water demand in 2023 ranged from a low of approximately 5.0 MG in February to a high of 19.9 MG in July. The City was able to meet water demands utilizing the groundwater from the production wells for all months except for the period between July and October, when demand is highest, and the Permit restricts groundwater pumping rates. The City obtains supplemental water from the neighboring cities of Warrenton and Seaside to meet the water demands during this period. In 2023, monthly imported water supply ranged from 0.002 MG in June to 13.4 MG in August.

The City began extracting groundwater under Permit G-16390 in July 2012 as part of their overall water supply. Prior to that date, the City imported all their water from Warrenton. The City imports between 25 and 35 million gallons of treated water from the City of Warrenton every year. Figure 17 provides the total water use for the City including groundwater and imported water since 2008.

Total annual water use by the City has increased from 94 million gallons (MG) in 2008 to 124.6 MG in 2023 (32%). Annual groundwater pumping has increased from 72 MG in 2013 to 93 MG in 2023 (29%). As a result of the increased groundwater pumping, imports from Warrenton have decreased from 94 MG in 2008 to 25 MG in 2019 and are currently 31 MG (2023).

Monthly groundwater pumping was entered into the model through MODFLOW well package for each of the City of Gearhart production wells from 2012 through 2023. These pumping volumes are based on the groundwater extraction data provided to ORWD under Permit G-16390 by the City since 2014 and supplemented by earlier records for 2008 through 2013.

Table 3 – City of Gearhart Water Supply for 2023

Month	Total Water Use (gallons)	Groundwater (gallons)	Imported Water (gallons)
Jan	5,209,329	5,209,329	0
Feb	5,022,862	5,022,862	0
Mar	5,799,061	5,799,061	0
Apr	5,755,926	5,755,926	0
May	12,935,778	12,935,778	0
Jun	17,855,717	17,853,104	2,613
Jul	19,889,336	8,154,645	11,734,691
Aug	18,853,878	5,436,259	13,417,619
Sep	13,539,593	7,422,235	6,117,358
Oct	7,521,681	7,521,681	0
Nov	6,167,180	6,167,180	0
Dec	6,062,309	6,062,309	0
Total	**124,612,650**	**93,340,369**	**31,272,281**

Pacific Ocean

The Pacific Ocean was simulated using the constant head boundary condition in MODFLOW applied to Model Layer 1. The boundary condition was applied to the active portion of Model Layer 1 that extends from the beach to the western model edge to simulate the Pacific Ocean (Figure 15). The constant head boundary condition was applied by using a freshwater-equivalent hydraulic head, to represent mean sea level (MSL) which is approximately 3.8 ft NAVD88 based on the NOAA tide gauge stations at Tillamook Bay, Oregon and Cape Disappointment, Washington.

The model does not include density-dependent flow to simulate seawater and freshwater interactions. The density effects of sea water from the Pacific Ocean were represented by calculating a fresh-water equivalent head. This procedure is based on a similar estimation of fresh-water equivalent head applied by the United States Geological Survey (USGS) in the coastal aquifer in Ventura County, California (Hanson, Martin, and Koczot, 2003). The freshwater-equivalent hydraulic head was calculated by multiplying the resultant water depth by the ratio of seawater to freshwater densities (approximately 1.026) and adding this value to the layer bottom elevation.

The advantage of defining the ocean as its own layer is that the groundwater aquifer, represented by Model Layers 2 through 5, is separated from the overlying boundary condition so that groundwater levels are less constrained by the boundary condition.

Evapotranspiration

The MODFLOW evapotranspiration (ET) package simulates ET losses from groundwater from transpiration by plants. Monthly average ET from the nearest coastal measuring station at Bandon (USBR, 2012) was used. Applied average monthly ET was applied to the appropriate stress period. As shown in Figure 18, three ET zones were defined. These used the same monthly ET value, but the extinction depth was varied to match the vegetation and environment. The applied extinction depths were defined as follows:

- Riparian areas along streams used an extinction depth of 3.5 feet.
- Elevated areas, such as the dunes, used an extinction depth of 1.5 feet.
- The bare sand areas used an extinction depth of 0.5 feet.

The simulated ET from groundwater primarily occurs in shallow groundwater in the marsh and forested areas along Neacoxie Creek and the unnamed drainage to the east. Essentially no ET from groundwater occurs in the elevated areas. No ET losses are applied to the Pacific Ocean, which is represented by a constant head boundary condition.

Surface Recharge

The MODFLOW recharge package simulates groundwater recharge from the surface. Surficial recharge consisted of three sources; include infiltration of precipitation, return flows from septic tanks, and irrigation (Figure 18).

Precipitation recharge is applied to all areas except the Pacific Ocean, which is represented by a constant head boundary condition. Precipitation data was obtained for the City of Seaside (WRCC, 2025) for the period from 1930 to 2023 (Figure 6). To account for surficial losses of precipitation by evaporation and transpiration by plants in the unsaturated zone, the monthly ET rate was subtracted from the monthly precipitation rate. The remainder is considered to represent the monthly recharge from precipitation. Using this approach, about 45% to 70% of the precipitation went to groundwater recharge, which is consistent with estimates from Frank (1970). Precipitation recharge accounts for 7.85 cfs, which is about 96% of the total surface recharge (Figure 19).

Surficial recharge from urban water use includes return flow of indoor use from septic systems and irrigation return from outdoor use. It was assumed that indoor use is the primary water use with outdoor uses limited to the summer months. It is assumed that 85% of indoor water use infiltrates back to the groundwater as domestic return flow. During the summer months 25% of total water use was assumed to be outdoor use with a return flow rate of 67%. The 67% rate is consistent with the percentage of infiltration of precipitation minus monthly ET and accounts for irrigation applied to sandy soils. Urban recharge accounts for 0.33 cfs, which is about 4% of the total surface recharge (Figure 19). The urban recharge is applied uniformly over the developed areas of the model domain as shown on Figure 18.

The golf course was handled separately to account for irrigation. It was assumed that irrigation would equal the average monthly ET minus the average monthly precipitation. If precipitation exceeded ET, then 0.5 inches was used. Furthermore, it was assumed that only 50% of the estimated irrigation rate would infiltrate to the groundwater as return flow. Golf course irrigation accounted for 0.06 cfs, which is less than 1% of the precipitation recharge (Figure 19).

The total recharge from all three sources were then distributed over subsequent months to account for varying rates in infiltration through the soil. The majority of the recharge reaches groundwater in the month that it falls; however, a portion of the recharge has a lag time for reaching groundwater. The calculated recharge was applied in the model by distributing it over a 3-month period. For each month,

the recharge is calculated as 70% from the current month, 20% from previous months, and 10% from the next previous month. This monthly distribution represents the physical process where a portion of the water finds a quick path through the soil to the groundwater whereas the remainder moves more slowly through the soil. This distribution is based on model calibration and previous experience.

Neacoxie Creek

Neacoxie Creek was simulated using the MODFLOW river package since the creek continually has water in it from freshwater water inflow from the north and tidal influences from the south. Neacoxie Creek was applied to Model Layer 4 (Figure 15). As a conservative assumption to represent groundwater-surface water interactions, the Neacoxie Creek bottom elevation is set at three feet below the topographic elevation along the creek channel based on the Seaside DEM model (Venturator, 2005).

The key components of the river package are the river stage and the streambed conductance. The streambed conductance is based on the following relationship (Harbaugh and others, 2005):

$$Conductance = \frac{length * width * hydraulic\ conductivity}{streambed\ thickness}$$

For the streambed conductance, the parameters used are a 22-foot-wide creek, a 22-foot creek length per model cell, a hydraulic conductivity of 4.0 feet/day and a two-foot streambed thickness. The hydraulic conductivity is 5 times lower than the hydraulic conductivity in the aquifer to represent the buildup of clay, silt, and organic matter on the creek bottom. This produced a streambed conductance value for the MODFLOW river package of 968 feet squared per day.

The river stage was varied to represent seasonal variation using the monthly average surface water elevation for SW MS1. The stream depth at SW-MS1 was applied along the length of Neacoxie Creek. The daily tidal influences in Neacoxie Creek were not simulated; however, the monthly average tidal influence is represented by a time-weighted average stream elevation based on data collected from SW-MS1. This is a conservative assumption that accounts for the long-term tidal influences on groundwater-surface water interactions.

The model representation of Neacoxie Creek is based on the available data. The extrapolation of the observed conditions to the simulated length of the creek provides conservative assumptions that allow for the appropriate level of accuracy to model groundwater-surface water interactions.

Other Surface Water Features

An area along the southern boundary applies the MODFLOW drain package to simulate interaction with the Necanicum River Estuary. The elevation of the drain package was based on the Seaside DEM model (Venturator, 2005) used to create the topography. This allows groundwater to be discharged to the Estuary following the hydrogeological conceptual model by Frank (1970). The drain package for these features was applied to portions of both Model Layers 3 and 4 in the drain boundary area along the southern boundary of the model (Figure 15).

An unnamed drainage area is located west of Highway 1 and east of Neacoxie Creek. An elevated sand dune hill separates Neacoxie Creek from this drainage. No data is available on the flow characteristics of this feature. This unnamed drainage is simulated using the MODFLOW drain package using a drain elevation that is two feet below the topographic elevation at each drain cell based on the Seaside DEM model (Venturator, 2005). Adding this drainage allows groundwater to discharge to a surface drainage in

the eastern portion of the model domain to better represent the groundwater elevation pattern shown on Figure 5 and the hydrogeological conceptual model by Frank (1970).

Groundwater Inflow And Outflow Boundaries

A general head boundary was placed along the eastern boundary to account for groundwater inflow and outflow through the subsurface (Figure 15). Groundwater elevations at the northern extent of the eastern constant head boundary varied from 8 feet in the early fall to 10 feet in the winter. At the southern extent of the eastern constant head boundary, groundwater elevations were varied from 2 feet in the early fall to 3 feet in the winter. Groundwater elevations were varied linearly between these end points. Water elevations for boundary condition were based on interpretation from groundwater elevation maps from Frank (1970).

No-flow boundaries are located along the northern and southern model boundaries. The northern no-flow boundary assumes that groundwater flow along the northern boundary is parallel to a groundwater flow line so there is no net flow across it. Portions of the southern boundary represent the Necanicum River Estuary. These other areas are assumed to be no-flow boundaries where groundwater flow is converging towards the Estuary.

Aquifer Parameters

Aquifer properties represent the hydrogeologic characteristics and physical characteristics of the aquifer that control groundwater flow. The model was constructed with 5 model layers (Figure 16). Model Layer 1 represents the Pacific Ocean whereas Model Layers 2, 3, 4 and 5 are subdivisions of the Quaternary sand dune aquifer. Model Layer 2 represents the seafloor interface with the aquifer.

Transmissivity and hydraulic conductivity are parameters that control the rate of movement of groundwater through the aquifer that are obtained through pumping tests and long-term groundwater analysis. Frank (1970) estimated that transmissivities ranged from 26,000 to 29,000 gallons per day per foot (gpd/ft). Saturated aquifer thicknesses ranged from 50 to 110 feet; therefore, the hydraulic conductivity ranged from 30 to 75 feet per day (ft/d). Pumping tests at the City of Gearhart wells in 2009 showed a wider range with transmissivity ranging from 11,000 to 26,000 gpd/ft. Saturated aquifer thickness in the vicinity of these wells ranged from 80 to 100 feet; therefore, the hydraulic conductivity ranged from 10 to 45 ft/d.

Based on model calibration, a uniform hydraulic conductivity of 20 ft/d was used for the sand dune aquifer (Model Layers 3 through 5) which falls within the City pumping test results. Vertical hydraulic conductivities are typically not measured directly; therefore, they are estimated based on model calibration. The vertical conductivity within the sand dune aquifer was assumed to be 10 ft/d. Model Layer 2 represents a thin portion of the dune floor along the Pacific Ocean seafloor and the aquifer properties were lowered in this model layer to represent seafloor conditions. Consequently, Model Layer 2 was assigned a hydraulic conductivity of 10 ft/d and a vertical conductivity of 5 ft/d.

It is assumed that the ocean bottom and shallow aquifer have a buildup of fine-grained sediments, organic matter, and calcium carbonate precipitate that would reduce the vertical hydraulic conductivity near the ocean interface. In addition, the density effects of the saltwater-freshwater would also limit the movement of groundwater into the ocean. These conditions support using a lower vertical hydraulic conductivity value during model calibration.

The coastal aquifer is considered an unconfined aquifer, and the model was assigned a convertible confined/unconfined aquifer condition. Using this option, MODFLOW applies confined conditions if the simulated groundwater elevation for a cell exceeds the model layer top elevation (Harbaugh et al., 2005).

For the model, groundwater storage was represented using a uniform specific yield of 15%, aquifer porosity of 25% and specific storage of 0.00225 per foot for Model Layers 2 through 5. These values are consistent with values for the Clatsop Plain dune sand aquifer from Frank (1970) and are within the published ranges for these parameters for unconsolidated sand deposits (Freeze and Cherry, 1979; Morris and Johnson, 1967). For Model Layer 1, the Pacific Ocean was simulated using a specific yield of 1.0 to represent open ocean conditions rather than a sandy aquifer.

MODEL CALIBRATION

The model was set up to represent historical conditions from 2008 through 2023. For model calibration, simulated groundwater elevations were compared to measured data. The measured groundwater elevation data have been collected in the City of Gearhart monitoring wells since 2008. During calibration, aquifer hydraulic conductivity and boundary condition parameters were varied within the range based on measured data to obtain the best fit of simulated to measured groundwater elevations at the eight monitoring wells: MW-1, MW-1A, MW-2, MW-2A, MW-3, MW-4, MW-5 and MW-6 (Figure 1).

Groundwater Contour Maps

Figure 20 shows the simulated groundwater elevation contours for the Spring 2023 (high water) condition and the Fall 2023 (low water) condition. Overall, the map shows a groundwater high underneath the City of Gearhart along a topographic high representing a former dune. Groundwater elevations are lower along Neacoxie Creek where groundwater discharges to the creek. The primary direction of groundwater flow is to the west towards the Pacific Ocean. A minor flow of groundwater is to the south towards Necanicum River Estuary.

The red arrows in Figure 20 represent groundwater flows to the Gearhart production wells using MODPATH. The area containing these arrows represents the source area of the water that is produced by the Gearhart wells. The model results show that the source area for the Gearhart wells is the high groundwater area in the large sand dune to the east. This is further illustrated in Figure 21 which shows an east-west cross-sectional view of the dune sand aquifer through one of the Gearhart production wells. This shows vertical groundwater flow lines from the source area to the well screen. These results indicate that the source area of groundwater extracted by the production wells is derived from surficial recharge from the sand dune area east of the wellfield.

MODPATH also calculates a travel time for a physical molecule of water to reach the groundwater extraction well from its source area. The average linear groundwater velocity is calculated by dividing the Darcy flux by the aquifer porosity using the following formula (Todd and Mays, 2004; Freeze and Cherry, 1979):

$$average\ linear\ groundwater\ velocity = \frac{hydraulic\ conductivity * hydraulic\ gradient}{aquifer\ porosity}$$

As discussed above, the hydraulic conductivity for the aquifer is 20 feet per day and the aquifer porosity is 0.25. The simulated hydraulic gradient within the source area ranges from 0.002 to 0.0065 feet per foot. The higher gradients typically occur following in the Spring following the winter rains and lowest in the summer. The average linear groundwater velocity varies from 5 to 15 feet per month. MODPATH integrates the hydraulic gradients for each monthly simulation stress period to represent the varying hydraulic groundwater conditions over time. Based on these results, the average linear groundwater velocity varies from 50 to 200 feet per year.

The model results show that the typical residence time of the surficial recharge in the aquifer is about seven (7) years. The residence time provides an approximate amount of time it takes for a water molecule

to migrate from the point of recharge to the production well. The residence time accounts for both the horizontal and vertical distance from the ground surface to the well screen. The typical groundwater flow line calculated by MODPATH from the source area to the well is about 1,000 feet; therefore, the seven-year residence time represents an average linear groundwater velocity of about 140 feet per year. The residence time within the aquifer offers sufficient opportunity for natural water treatment and filtration of potential contaminant sources, such as septic tank discharge, to occur (DWR, 2024). This is supported by the data that show no water quality violations presented in the City's Annual Water Quality Reports (City of Gearhart, 2025).

Groundwater Elevation Hydrographs and Statistics

Figures 22 and 23 show the hydrographs for the eight monitoring wells for the 15-year period from October 2008 to September 2023. Overall, the hydrographs for all eight wells show close conformity to the overall seasonal variation of measured groundwater elevations for both magnitude and trend. The model was able to simulate the groundwater elevations for the foredune monitoring wells near the coast (MW-1, MW-1A, MW-2, MW-2A and MW-3) as well as the landward monitoring wells (MW-4, MW-5 and MW 6). Monitoring well MW-6 is also located near to Neacoxie Creek to provide data for evaluating groundwater-surface water interaction with Neacoxie Creek. To get these appropriate magnitude and seasonal variation in the foredune wells, the key calibration parameter was the vertical hydraulic conductivity between the aquifer and the Pacific Ocean. It was necessary to form resistance to flow into the ocean otherwise groundwater levels were too low, and the seasonal variations were too flat. For the landward monitoring wells, the horizontal hydraulic conductivity of the aquifer and the streambed conductance with Neacoxie Creek were the key calibration parameters.

The model calibration results are summarized as follows:

- The correlation coefficient between simulated and observed measurements is 93%, which indicates a strong correlation for a long-term (15 years) period under varying hydrologic conditions.
- The residual mean for the model is -0.07 feet. The residual mean is computed by dividing the sum of the residuals by the number of residual data values. The closer this value is to zero, the better the calibration.
- The standard deviation for the calibrated model is 1.08 feet. The residual standard deviation evaluates the scatter of the data. A lower standard deviation indicates a closer fit between the simulated and observed data.
- The absolute residual mean for the model is 0.79 feet. The absolute residual mean is a measure of the overall error in the model and lower values indicate better calibration. The absolute residual mean is computed by taking the square root of the square of the residuals and dividing that by the number of residuals.

Another statistical measure of calibration is the ratio of the standard deviation of the mean error divided by the range of observed groundwater elevations. This ratio shows how the model error relates to the overall hydraulic gradient across the model. Typically, model calibration is considered good when this ratio is below 0.15 (ESI, 2020). The ratio for the Gearhart Groundwater Model is 0.076, which is another indicator that the model is well calibrated.

Overall, the model was able to match both the magnitude and duration of seasonal groundwater level variations, and the longer-term response to annual variations in precipitation and groundwater pumping. A comparison of simulated versus measured hydrographs for these eight wells shows a close match over

the fifteen-year calibration period from 2008 through 2023. This period includes a range of hydrologic conditions ranging from high rainfall year to local droughts. Matching these trends is important to demonstrate that the model has the capability to simulate historical changes in groundwater elevations and is therefore capable of forecasting future changes in groundwater elevations. This capability is necessary for the model to serve as a useful groundwater management tool.

Groundwater Budgets

The historical water budget is provided in Table 4. The results are shown in cubic feet per second (cfs) to be consistent with the units used in Permit G-16390. The water budget shows that the groundwater inflow for the dune aquifer in the Gearhart area is almost entirely the result of precipitation recharge. Recharge from Neacoxie Creek and the Pacific Ocean was shown to contribute negligible to no recharge to groundwater.

Table 4 – Average Annual Water Budget for Historical Period of 2008 to 2023

	Entire Simulation (2008-2023)	Pre-Pumping Period (2008-2011)	Pumping Period (2012-2023)
INFLOW	**(cfs)**	**(cfs)**	**(cfs)**
Surficial Recharge	8.192	8.319	8.160
Neacoxie Creek	0.000	0.000	0.000
Ocean	0.000	0.000	0.000
GW Inflow	0.002	0.001	0.002
Inflow Total	**8.194**	**8.320**	**8.162**
OUTFLOW	**(cfs)**	**(cfs)**	**(cfs)**
Pacific Ocean	2.235	2.435	2.310
Neacoxie Creek	2.739	2.798	2.724
GW Outflow	0.873	0.894	0.868
Pumping Wells	0.261	0.000	0.327
Other drainage	1.289	1.309	1.285
ET	0.742	0.757	0.738
Outflow Total	**8.240**	**8.192**	**8.252**
GW Storage	**(cfs)**	**(cfs)**	**(cfs)**
Net GW Storage Change	**-0.046**	**0.128**	**-0.090**

Note: Monthly pumping rates in cubic feet per second (cfs) to be consistent with pumping limits provided in Permit G-16390

The outflow represents locations where groundwater leaves the aquifer or migrates outside of the model area. The average volumetric outflow distribution shown on Table 4 is characterized below:

- Pacific Ocean outflow ranges from 28% to 30% of the total outflow
- Neacoxie Creek outflow ranges 33% to 34% of the total outflow
- Boundary groundwater outflow is about 11% of the total outflow
- Gearhart Well pumping ranges from 0% to 4% of the total outflow
- Drainage outflows ranges are about 16% of the total outflow
- ET outflow ranges are about 9% of the total outflow

Comparing the Pre-Pumping Period water budget to the Pumping Period, the average annual Gearhart pumping changes from 0.0 to 0.327 cfs. The largest changes in the outflows to compensate for the groundwater pumping are from Pacific Ocean Outflow with a decrease of 0.125 cfs and a decrease in aquifer storage of 0.218 cfs. Based on the water budget, the increased outflow in groundwater pumping primary reduces Pacific Ocean outflow and reduces storage, which is represented by a lowering of groundwater elevations.

The sum of the change in outflow from Neacoxie Creek, boundary groundwater outflow, other drainages and ET are a decrease of 0.143 cfs. There is also a 0.159 cfs decrease in surficial recharge between these periods. The model results indicate that the changes in these four outflows are controlled by changes in surficial recharge that is primarily from precipitation.

The water budget results (Table 4) show Neacoxie Creek as a gaining stream with only groundwater outflows into the creek and no groundwater inflows from creek. This is due to the higher groundwater elevations in the elevated sand dune areas paralleling the creek sustaining sufficient hydraulic gradients to drive groundwater flow into the creek. The change between the Pre-Pumping to Pumping is most likely attributed to variations in surficial recharge from precipitation.

The historical water budget is also summarized graphically in Figure 24 which shows the units in millions of gallons per day to be consistent with water volume reporting by the City. The graphical display helps to visualize the annual variability and relative proportion of the water budget components. The variability in the inflow is controlled by the annual precipitation, which is by far the largest water budget component. The overall outflows vary in proportion to inflows (precipitation recharge). Groundwater pumping currently accounts for about 4% of the water budget and is the smallest outflow component.

There are relatively minor changes in annual groundwater in storage of less than one percent over the 2009 to 2023 time period. Storage change represents the volume of water stored in the aquifer and, in this situation, is reflected in changing groundwater elevations. This indicates that the system is a well-balanced system with no long-term declines in groundwater elevations.

MODEL SENSITIVITY ANALYSIS

A sensitivity analysis was conducted on the streambed conductance by varying the streambed hydraulic conductivity in the calibrated historical model relative to the calibrated value (4.0 ft/d). The range of streambed hydraulic conductivities ranged from 2 to 10 ft/d. No other factors were changed in these simulations. The results are shown for two key parameters in Table 5.

Table 5 – Projected City of Gearhart Pumping Rates Used in Scenarios (in cfs)

Streambed Hydraulic Conductivity[1]	10 ft/d	8 ft/d	6 ft/d	5 ft/d	4 ft/d	3 ft/d	2 ft/d
Residual Mean[2]	0.25	0.20	0.11	0.05	-0.05	-0.21	-0.52
Outflow to Creek[3]	2.84	2.82	2.80	2.77	2.74	2.69	2.59

1: Streambed hydraulic conductivity is in feet per day
2: Residual mean is difference between measured and observed groundwater elevation at MW-6 in feet
3: Outflow to Creek is simulated groundwater outflow to Neacoxie Creek in cfs

The residual mean is the difference between measured and observed groundwater elevation at MW-6 over the 15-year simulation period. For the residual mean, the best result is the one that is closest to zero. From the sensitivity analysis, the zero residual mean would occur at 4.5 ft/d. The Outflow to Creek

water budget component is the average annual simulated groundwater outflow to Neacoxie Creek over the 15-year simulation period. Therefore, changing the streambed conductance to 4.5 ft/d from 4.0 ft/d would increase flow to Neacoxie Creek. When distributed along the entire length of the stream, this is about 0.015 cfs, which is about 0.5% of the total creek outflow.

The sensitivity analysis shows that streambed conductance is a relatively low sensitivity parameter. The groundwater-surface water interactions are controlled by the regional groundwater hydraulics of the high groundwater elevations in the elevated dune areas flowing towards outflow areas such as Neacoxie Creek, Pacific Ocean and others. The range of hydraulic conductivities that are included in the sensitivity analysis range from sand to silty sand rather than a clay layer. This is consistent with the creek located on a dune sand aquifer. A slightly lower streambed conductance relative to the aquifer represents the deposition of fine-grained sediments and organic deposits carried by the stream and the incoming tides that are deposited on the streambed. These deposits provide only a minor restriction to the groundwater-surface interactions as shown by the outflow to the creek at 4 ft/d as 96% of the outflow that would occur at 10 ft/d. Therefore, the selection of the streambed conductance was applied to real streambed conditions as shown by the slight improvement in model calibration. The streambed does not provide a barrier to flow but as shown by the model results allows for the relatively free exchange of groundwater with the stream.

PROJECTED-FUTURE PUMPING SCENARIOS

A series of four scenarios were developed to represent the range of projected pumping by the Gearhart municipal wells under varying climatic conditions. The groundwater flow was simulated using MODFLOW and MODPATH to calculate the groundwater flow lines to determine source area for the Gearhart wells. The following discussion documents the setup and results of these scenarios.

Scenario Assumptions

Four projected-future pumping scenarios were developed to evaluate potential impacts that may result from the increased pumping requested in the expanded water rights application. The scenarios provide a 20-year transient simulation with the underlying groundwater model based on the historical calibrated model. The four scenarios are as follows:

- No pumping Scenario – No pumping at Gearhart wells and no septic or irrigation return flows over 20 years; therefore, it represents a natural or pre-development condition.
- Baseline Scenario – October 1, 2022 to September 30, 2023 pumping applied constantly over 20 years.
- Growth Scenario - Increasing pumping based on projected growth starting from Baseline Scenario pumping rate.
- Build Out Demand - Maximum pumping from Growth Scenario applied constantly over 20 years.

The monthly groundwater pumping rate was based on historical records on average pumping per month for the period from 2012 to 2023. The pumping rates used for each scenario are summarized in Table 6. Pumping rates in Table 6 are presented in cubic feet per second (cfs) to be consistent with pumping limits provided in Permit G-16390.

The four pumping scenarios used the same natural hydrology to provide a consistent comparison between each scenario. Precipitation is based on the City of Seaside weather station for the period from 2000 to 2019. This period was selected because it includes an extended drought period from 2000 to 2009 where 9 of the 10 years are below average precipitation including three of the four driest years measured in Seaside since 1930. This approach provides a conservative scenario for evaluation of potential impacts.

Return flows from septic systems were adjusted proportionally to the increased water demand in the Baseline, Growth and Build-Out scenarios.

Table 6 – Projected City of Gearhart Pumping Rates Used in Scenarios (in cfs)

	No Pumping Scenario	Baseline Scenario	Growth Scenario	Growth Scenario	Build-Out Scenario
	Continuous Pumping Rate	Continuous Pumping Rate	Initial Pumping Rate	Ending Pumping Rate	Continuous Pumping Rate
Month	**cfs**	**cfs**	**cfs**	**cfs**	**cfs**
Oct	0	0.52	0.52	0.63	0.63
Nov	0	0.34	0.34	0.41	0.41
Dec	0	0.33	0.33	0.40	0.40
Jan	0	0.30	0.30	0.37	0.37
Feb	0	0.28	0.28	0.34	0.34
Mar	0	0.37	0.37	0.45	0.45
Apr	0	0.37	0.37	0.45	0.45
May	0	0.53	0.53	0.64	0.64
Jun	0	0.76	0.76	0.92	0.92
Jul	0	0.89	0.89	1.08	1.08
Aug	0	0.94	0.94	1.14	1.14
Sep	0	0.70	0.70	0.85	0.85
Average Annual	**0**	**0.53**	**0.53**	**0.64**	**0.64**

Note: Monthly pumping rates in cubic feet per second (cfs) to be consistent with pumping limits provided in Permit G-16390

Projected-Future Scenario Results

The groundwater elevation contour maps for the four Projected-Future Scenarios are shown in Figures 25, 26, 27 and 28 for the No Pumping, Baseline, Growth and Build-Out scenarios, respectively. The purpose of the scenarios is to provide an assessment of potential future changes from increased water use during July through October as outlined in the water rights application. Therefore, the figures show both June and September conditions for the final year of each respective scenario. June represents groundwater conditions under the existing permit and September represents conditions under the proposed changes.

For each scenario, the amount of groundwater pumping is the only factor that changes. In general, increasing groundwater pumping results in a drawdown depression around the wellfield. The area of higher groundwater elevations immediately to the east show declines that increase from 1 to 3 feet with the increasing pumping rates of the various scenarios. However, the groundwater elevations in the eastern half of the modeled area for all four scenarios show little to no variation, which infers that pumping at the Gearhart wellfield has minimal to no effect in these areas.

MODPATH groundwater flowlines show that the groundwater source area to the Gearhart wells generally increases in width with increased pumping (Figures 25, 26, 27 and 28). Figure 29 shows the MODPATH groundwater flow lines in a vertical cross section for all four scenarios. It shows that the source area gets thicker with increasing pumping at the Gearhart wells. This is represented on the groundwater contour

maps by decreasing groundwater elevations in the sand dune source area. The model results show that the travel time from the groundwater surface to the production well screen for the three pumping scenarios is about seven years, which is similar to those calculated for the calibrated model.

MODPATH groundwater flowlines show that groundwater flow across the wellfield area under no pumping conditions is similar to that of the calibrated model (Figure 20). For the No-Pumping Scenario, the flow lines represent the natural direction of flow of groundwater across the Gearhart wellfield area. By comparing to the No-Pumping Scenario, the source areas for the pumping scenarios generally grow progressively wider with increasing pumping rates between the different scenarios; however, the overall length and direction of flow remain consistent. This further supports the conclusion that the water produced by the production wells is derived from the higher groundwater mound underlying the higher sand dune to the east. These results also indicate that the source area for the Baseline, Growth and Build-Out Scenarios can be sustained by the aquifer without expanding the source area into areas that could directly interact with Neacoxie Creek or the Pacific Ocean.

Hydrographs for the foredune monitoring wells (MW-1A, MW-2A and MW-3) are provided in Figure 30. These hydrographs show that pumping scenarios groundwater elevations are generally about 5 feet lower at these wells when compared to the No Pumping Scenario. However, groundwater elevations in the different pumping scenarios differ generally less than one foot. Groundwater elevations at MW-2A are the lowest due to its location downgradient of the center of the wellfield; however, it remains above the 3-foot threshold set in the permit. Optimization of pumping distributions over time could be used to improve conditions at MW-2A.

Hydrographs for the landward monitoring wells (MW-4, MW-5 and MW-6) are provided in Figure 31. The landward wells are located progressively further from the Gearhart wells with MW-4 being the closest and MW-6 being the furthest. This is reflected in the change in groundwater elevations between the No Pumping and the three pumping scenarios which become progressively less with increased distance from the production wells. MW-4 has a 3-foot difference, MW-5 has less than a one-foot difference, and MW-6 has essentially no difference. The groundwater elevations of the three pumping scenarios are essentially the same at each location. This is consistent with their locations, with MW-4 on the east margin of the Gearhart well source area simulated by MODPATH, whereas MW-5 and MW-6 are located outside of the source area.

The projected future water budget is provided in Table 7. The water budget period simulates a 20-year period based on 2000 to 2019 precipitation data. This period includes a range of hydrologic conditions including wet and dry years. Overall, the water budgets for the projected future scenarios are similar to the historical results. Surficial recharge accounts for nearly all the inflow. The No Pumping Scenario does not include urban return flows, so the surficial recharge is about 0.4 cfs less than the three pumping scenarios. Inflows from Neacoxie Creek, Pacific Ocean and groundwater inflows along the model margin are essentially identical. The variation in the surficial recharge between the No Pumping and the three pumping scenarios is due to the change in urban return flow among the scenarios.

The outflow represents the different locations where groundwater leaves the aquifer or migrates outside of the model area (Table 7). The Pacific Ocean outflow generally decreases with increasing pumping. Pacific Ocean outflow for the Build-Out Scenario is 0.26 cfs lower than the No Pumping Scenario and 0.045 cfs lower than the Baseline Scenario. Outflows of groundwater to Neacoxie Creek tend to increase with increasing pumping. This represents urban return flows from pumped water over the developed areas of the City. As a result, the urban return flow is widely distributed and is reflected in increased outflows to Neacoxie Creek, unnamed drainage, Necanicum River Estuary and groundwater flow out of the modeled area.

The projected-future water budgets are summarized graphically in Figures 32 and 33. There are relatively minor changes in groundwater in storage of less than one percent. The water budget graphs help illustrate that the effects of the proposed changes in groundwater pumping are relatively small compared to the overall groundwater budget. The change in pumping between the Baseline and Build-Out Scenarios is 0.113 cfs (80,000 MGD), which represents about 1.5 percent of the total water budget. This supports that the volume of the proposed groundwater pumping is well within the capacity of the local sand dune aquifer.

Similar to the calibrated model results, Neacoxie Creek is shown to be a gaining stream. The Neacoxie Creek inflow of 0.002 remains constant throughout the scenario. After further inspection of the model results, the Neacoxie Creek inflow was found to occur in upstream areas north of Gearhart Avenue (Figure 12) during the extended drought period included as a conservative assumption in the projected future scenario. This observation combined with the higher outflows of groundwater into Neacoxie Creek in the higher pumping scenarios demonstrates the lack of connection of Neacoxie Creek with Gearhart pumping. The salt marsh conditions along Neacoxie Creek are supported by tidal influences from the estuary and would be unaffected by the proposed pumping from the Gearhart wellfield based on the results of the projected future scenarios.

Table 7 – Average Annual Water Budget for 20-Year Projected Future Scenarios

	No Pumping	Baseline Scenario	Growth Scenario	Build-Out Scenario
INFLOW	**(cfs)**	**(cfs)**	**(cfs)**	**(cfs)**
Surficial Recharge	7.289	7.702	7.743	7.789
Neacoxie Creek	0.002	0.002	0.002	0.002
Pacific Ocean	0.000	0.000	0.000	0.000
GW Inflow	0.003	0.002	0.002	0.002
Inflow Total	**7.297**	**7.709**	**7.751**	**7.794**
OUTFLOW	**(cfs)**	**(cfs)**	**(cfs)**	**(cfs)**
Pacific Ocean	2.212	2.002	1.982	1.959
Neacoxie Creek	2.587	2.638	2.643	2.649
GW Outflow	0.882	0.916	0.920	0.924
Pumping Wells	0.000	0.530	0.585	0.643
Other drainage	0.859	0.891	0.894	0.898
ET	0.740	0.732	0.732	0.730
Outflow Total	**7.281**	**7.710**	**7.755**	**7.802**
GW Storage	**(cfs)**	**(cfs)**	**(cfs)**	**(cfs)**
Net GW Storage Change	**0.013**	**-0.004**	**-0.008**	**-0.008**

SUMMARY AND CONCLUSIONS

This report provides a summary of the updated groundwater flow model and applied pumping scenarios to evaluate the potential impacts of increased Gearhart well pumping requested in the City's application for expanded groundwater use. The evaluation has been based on the following:

- The geology is based on the classic reference by Frank (1970) who defined the overall geological controls on the aquifer.
- The groundwater flow model and supporting analysis were developed utilizing the City's groundwater monitoring data collected since 2014.
- The conceptualization has been updated with an understanding of the tidal influences and habitats of the Necanicum River Estuary from the Oregon Estuary Plan Book (Cortright and others, 1987) that shows that the estuary near Gearhart, including Neacoxie Creek, are strongly influenced by the semidiurnal tides every lunar day.
- Neacoxie Creek is defined as a slough subsystem within the estuary that is tidal influenced salt marsh habit across much of Gearhart. During low streamflow conditions, such as during the period from July through October, the tidal effects are the predominant influence on stream flow in Neacoxie Creek. Data collected by the City confirms this by showing influence on daily tides on surface water levels and inundation of the creek with brackish to marine water on a daily to weekly basis.

The existing groundwater flow model was updated with the City's groundwater and surface water monitoring data collected since 2014. The model was recalibrated and achieved a strong correlation (93% correlation factor) over the 15-year calibration period that includes both wet and dry hydrologic years and variable groundwater pumping. The calibration hydrographs demonstrate that the simulated groundwater elevations show a strong match to the magnitude, amplitude of seasonal variations and long-term trends seen in the measured data at the eight monitoring wells. The results of the model simulation show that the source area for the Gearhart wellfield is mostly limited to the vicinity of the production wells, and that it is primary derived from groundwater in the elevated sand dune areas located immediately east of the wellfield.

Four projected future scenarios were developed to evaluate the potential impacts of the proposed changes in the water rights application along with potential projected population growth. The results of the projected future scenarios show the following:

- The change in pumping between the Baseline and Build-Out Scenarios is 0.113 cfs (80,000 MGD), which represents about 1.5 percent of the total water budget. This supports that the volume of the proposed groundwater pumping is well within the capacity of the local sand dune aquifer.
- The model results show that the travel time from the groundwater surface to the production well screen is about seven years. These results indicate that the source area of groundwater extracted by the production wells is derived from surficial recharge from the sand dune area located immediately east of the wellfield.
- The model simulations show no infiltration from Neacoxie Creek to groundwater during the calibration model for the period from 2008 to 2023. The projected future scenarios show that 0.002 cfs of flow from Neacoxie Creek to groundwater occurs during the simulated low rainfall years. The projected future scenarios show that groundwater discharge into Neacoxie Creek increases slightly with higher pumping due to increases in urban recharge.

- The salt marsh conditions along Neacoxie Creek are supported by tidal influences from the estuary and would be unaffected by the proposed pumping from the Gearhart wellfield.
- The model indicates reduced outflow to Pacific Ocean but remains high, and simulated hydrographs show that groundwater levels maintain the 3-foot elevation threshold for the foredune monitoring wells as established in the Permit.

Overall, the results of the detailed groundwater modeling analysis indicate that the proposed changes to maximum monthly pumping levels for July through October in the water rights application would not lead to changes to flow in Neacoxie Creek, nor would they result in lowered groundwater levels in the foredune area sufficient to induce seawater intrusion to the Gearhart wells.

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FIGURES

Oregon Water Resources Department

FORM M

FOR MUNICIPAL AND QUASI-MUNICIPAL WATER SUPPLIES

[Information needed to make findings related to ORS 537.153(3)(c)]

- Please supply the required information in the spaces provided below. If any section of this form is not applicable, please write N/A and provide an explanation why it does not apply.
- Do not attach reference documents. If there is a need, the Department will request them.
- Your signature is certification that identified information is contained in the reference document(s).
- If adequate space is not available on this form to describe and justify your request for additional water, attach additional pages as necessary.

Water Supplier Information

Please provide the following information related to the water supplier requesting additional water. It should be noted that the name of a water supplier is often different than the service area (*e.g., City of ABC and XYZ Urban Growth Boundary*).

Cities are not the only municipal corporation; many kinds of special districts are also allowed to purvey water. Applications requesting to use water for Quasi-Municipal use may be submitted by entities including, but not limited to, the following types of governance: a water association; private water company; or (*if under the articles of incorporation*) a broader corporation such as a destination resort. Please attach a copy of the article of incorporation related to your distribution of water.

Name of Water Supplier/Entity	Name of Service Area	Governance	Contact Person
City of Gearhart	Gearhart	Municipality	Chad Sweet
List any water suppliers within the same service area and/or any self-supplied industrial user. (Attach an extra sheet, if necessary.)			
City of Warrenton	North Coast Basin	Municipality	Leslie W. Newton

Request for Additional Water

Briefly explain the reason(s) for your request for additional water (*e.g. loss of current supply, backup, emergency supply, peak demand, growth, or other*). Much of the information needed may be contained in your Water Management and Conservation Plan, Water System Master Plan, or Capital Improvement Plan (*as applicable*).

Reason(s) for the Request for Additional Water	Timetable for Development of the Additional Water	Justification for Water Source & Amount Requested
Seasonal peak demands and population growth	2025	1.5 cfs

Received
MAY 05 2025
OWRD

Received
APR 11 2025
OWRD

Water Management and Conservation

- Do you have an approved Water Management and Conservation Plan? ☒ Yes ☐ No
- List the "In-Effect" date of your most recently approved Water Management and Conservation Plan: April 2023
- Is your system fully metered? ☒ Yes ☐ No
- Do you perform annual water audits? ☒ Yes ☐ No
- Annual amount of water produced (MG): 93 *(diverted or appropriated)*
- Annual amount of water billed for (MG): 124.5 *(metered consumption)*
- Identify your system's current annual water loss: 2% *(difference between the amount of water produced and the water billed for)*
- Describe your rate structure and billing schedule: Bi-monthly billing schedule. Standard commodity rate with rate multiplier for high-demand water users.

[e.g., commodity rate (uniform rate, declining or inverted block rate); fixed charge with a commodity rate; or a fixed charge and commodity rate using a seasonal differential.]

Population

A supplier's population includes both permanent residential and transient populations. Residential population should be from census data or, if estimated, the method of estimation must be documented. Adopted comprehensive land use plans, water system master plans, or water management and conservation plans are examples of acceptable documentation. Transient populations are routine users of water by employers (*such as manufacturing or call center type facilities*) that increase the demand within a supplier's service area. Resort bi-monthly areas, regional airports, sea ports, areas with seasonally variable populations, and colleges/universities are also subject to this transient population test. Special events which are rare occasions (*such as parades, rodeos, festivals, etc.*) are not reasons to apply the transient population test.

Below, please indicate the current population to which you serve water and cite the source of that information. Please also provide the historic population growth rate over the past 10 years and the projected population you anticipate serving in 20 years.

Present Population being Served:	**Source of Information**
~2,725	Gearhart Water Management & Conservation Plan (2023)
Historic population growth rate over the past 10 years:	**Source of Information**
1,475 (2014) 2,068 (2024) (40%)	Portland State Univ. (https://www.pdx.edu/population-research/population-estimate-reports)
Projected Population to be Served in 20 Years:	**Source of Estimate/Method Used**
4,265 (2045) (2.26% Annual Average Growth Rate)	U.S. Census Bureau

Current Water Supply

In the table below, please describe all of the sources of your current water supply inventory (*both active and inactive*). Identify those sources and associated water rights that are currently in use. Additionally, please identify any water sources/water rights that are not currently used, or used only on a seasonal or emergency basis, and describe the reason(s) why. If any portion of your water supply is being purchased, identify the supplying entity and, if possible, indicate the water source.

Water Source (Include any wholesale purchases of water)	**Water Right Numbers** (Permit and/or Certificate)	**Priority Date**	**Amount of Water Allowed**	**Actively Used?** (Yes or No) If "No," explain.
Gearhart Wellfield	G-16390	June 28, 2005	373.3 MG	Yes
City of Warrenton	S-2032	May 26, 1914	45 MG	Yes

Is this application for a new water use permit intended to be used as a primary or backup source? Explain how this right will be used to meet current demand and/or how it will be used to increase reliability and resiliency?

Water is needed to meet future population growth and increased seasonal demands during peak summer months.

Current Water Use

Describe the nature of your current demands for water, as well as the water sources used to meet those needs.

Current Demands for Water (Year: 2023)

Water Source (Including wholesale water purchases)	**Water Right Numbers** (Permit and/or Certificate)	**Peak or Maximum Demand**		**Average Demand**	
		Maximum Instantaneous Rate (in cfs or gpm)	Maximum Daily Demand (MG)	Average Daily Demand (MG)	Average Annual Demand (MG)
Gearhart Wellfield	G-16390		0.59	0.34	93.4
City of Warrenton	S-2032				31.2

- Per-capita daily demand (in gallons): 130
  (Divide average annual water sales by population to arrive at consumption, and then divide by 365 to get daily values.)
- Peak season (by month/day): 6/1 to 9/1
- Peak Season number of hours diverted/pumped (if available): _____
- Peak season per-capita daily consumption (in gallons): 215
  (Divide total peak season demand by population and the number of days during the peak.)
- Peaking Factor (ratio between max day demand and average day demand): 2.7

Projected Water Use

Describe your anticipated water demands for the next 20 years and identify the sources of water (*existing and/or new*) that will be used to meet those demands. Please also describe the methodology and/or information source used to make the projected water demand estimates.

Projected Demands for Water in 20 Years (Year:2045)

- Current average per capita demand (in gallons): 130
- Projected population served in year **(2045)**: 4,265 (per U.S Census Bureau)
- Projected average annual demand (MG): 204
- Projected average daily demand (MG): 0.6
- Current peaking value: 2.7
- Projected maximum daily demand (MG): 1.27

Water Source (Including wholesale water purchases)	**Water Right Numbers** (Permit and/or Certificate) If a new water source, indicate so.	**Projected Peak Daily Demand**		**Projected Average Daily Demand**	
		Maximum Instantaneous Rate (in cfs or gpm)	Maximum Daily Demand (MG)	Average Daily Demand (MG)	Average Annual Demand (MG)
Gearhart Wellfield	G-16390	1.96 cfs	1.27	0.54	199
City of Warrenton	S-2032	0	0	0	0

Source or Methodology Used for Demand Projections:

Gearhart Historical Water Use Data (2013–2023)

Gearhart Water Management & Conservation Plan (April 2023)

Portland State Univ. – Population Estimate Reports (July 2024)

Describe any issues, deficiencies or limitations associated with your current water supply inventory contributing to the need to acquire additional water in order to satisfy your current and/or projected 20-year demands:

Gearhart's existing Permit (G-16390) curtails the allowable groundwater pumping rates from July through October each year when seasonal water use demands are highest. In addition, the City has experienced unexpected population growth over the past several years which put added stress on the City's water system. The City is requesting additional water to meet the peak seasonal water demands and anticipated population growth.

Annual Water Use by Type

In the table below, list the quantity of water diverted for each type of water use and the percentage of the total diversion associated with that use type:

Type	Current Use		Use In 20 Years	
	Quantity Diverted:	Percentage of Total Diversion:	Projected Quantity to be Diverted:	Percentage of Total Diversion:
Residential:	120 MG	96%	196 MG	96%
Commercial:	4.6 MG	4%	8 MG	4%
Institutional[1]:	1.25 MG	1%	2 MG	1%
Agricultural[2]:				
Industrial:				
Other: (specify use)				
System Water Loss:	2.5 MG	2%	4 MG	2%
Total Diverted:	125 MG	100%	205 MG	100%

[1]: Institution use includes water served to hospitals, federal, state, or municipal connections, and school districts.
[2]: Agricultural use includes any type of customer with a service connection dedicated for the raising of livestock or edible or non-edible crops.

Last revision: May 1, 2018/WRSD

Legend

- Monitor Well
- Gearhart City Production Well
- Neacoxie Creek SW-MS1 Monitoring Location

0 0.25 0.5

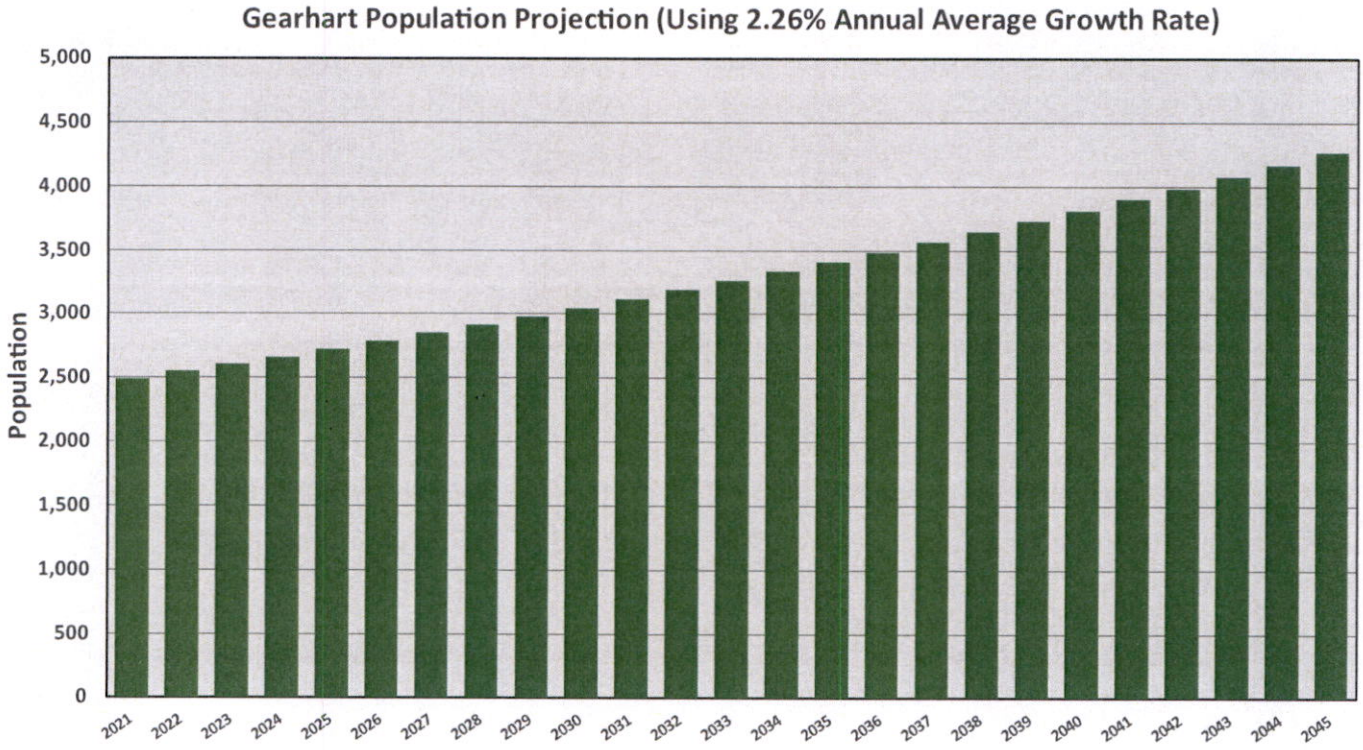
Scale: Miles

N

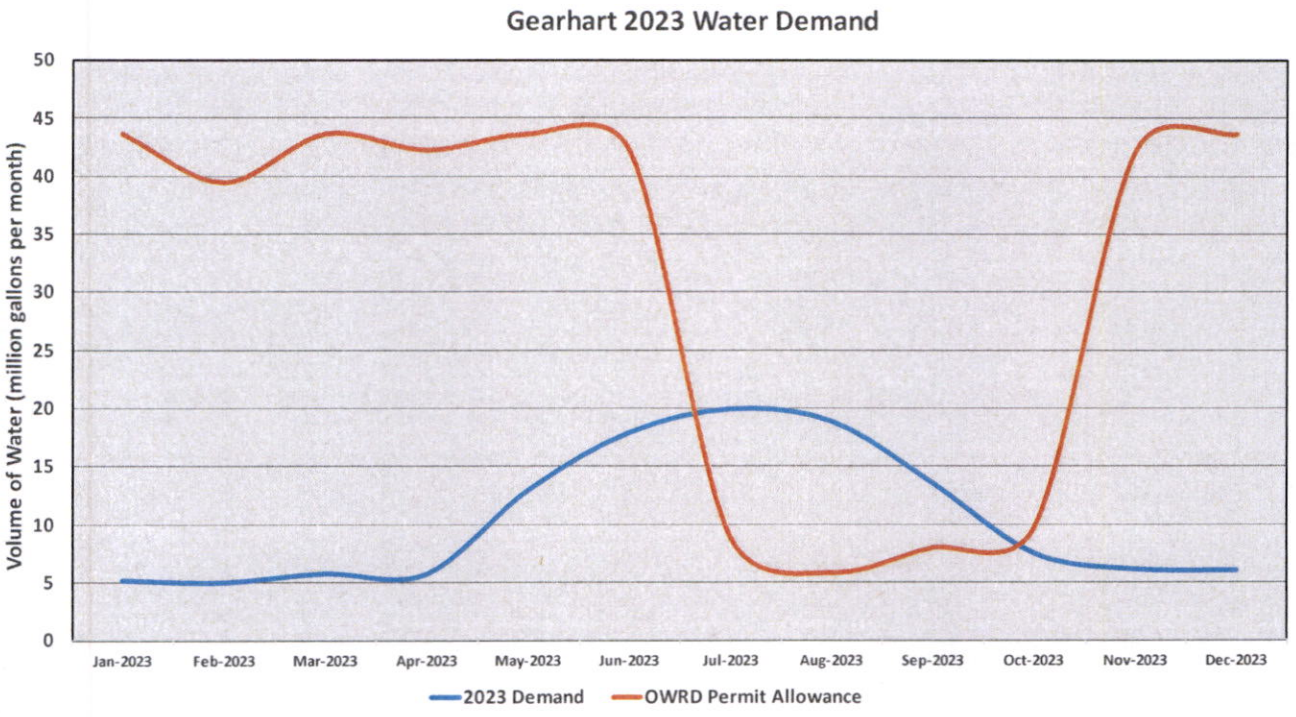
March 2025

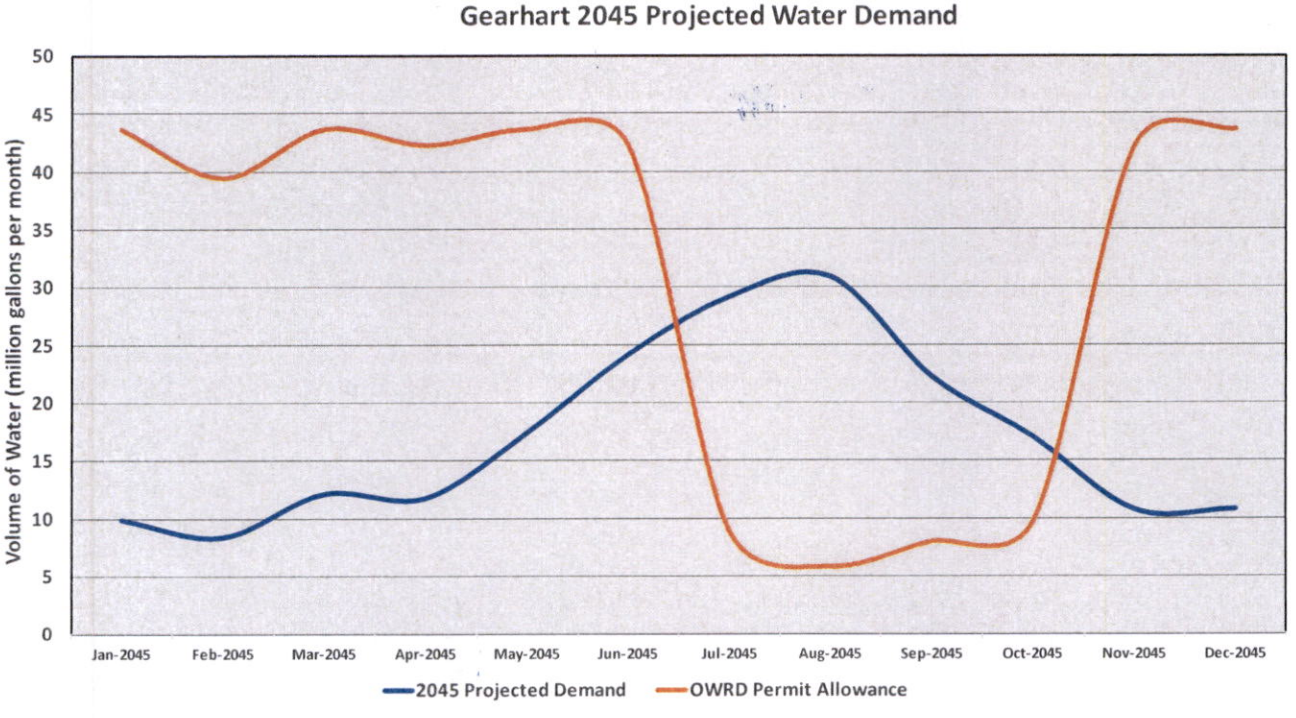
TODD GROUNDWATER

Figure 1
City of Gearhart
Well Location Map



March 2025	Figure 2 Gearhart Population Projection for 2021 to 2045
TODD GROUNDWATER	





March 2025

TODD GROUNDWATER

Figure 3
Gearhart 2023 Water Demand Compared to 2045 Projected Water Demand

Source: Google Earth

N

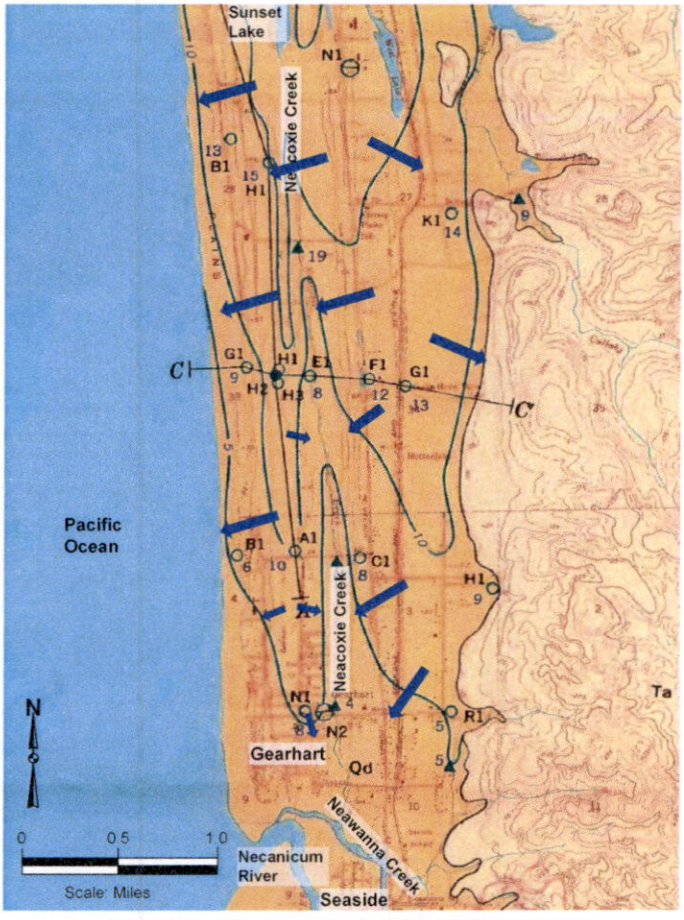
0 0.25 0.5

Scale: Miles

March 2025

TODD GROUNDWATER

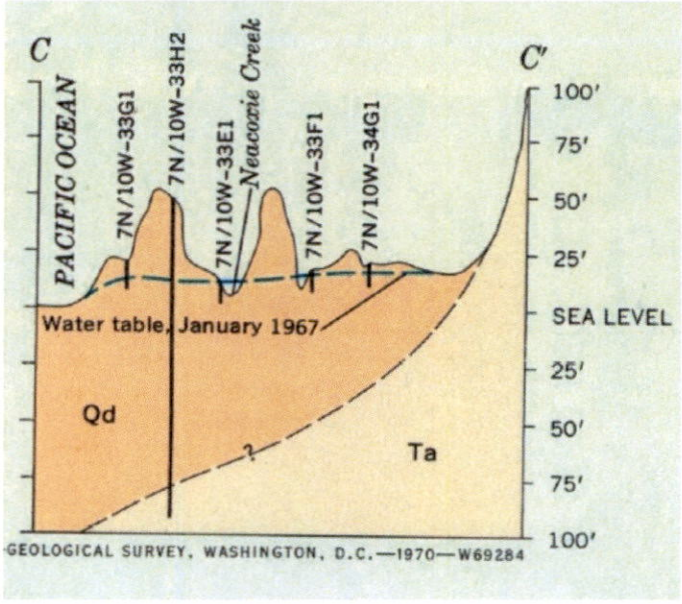
Figure 4
Gearhart Regional Location Map



Groundwater Elevation Map – October 1966 (Frank, 1970)

Groundwater Flow Direction

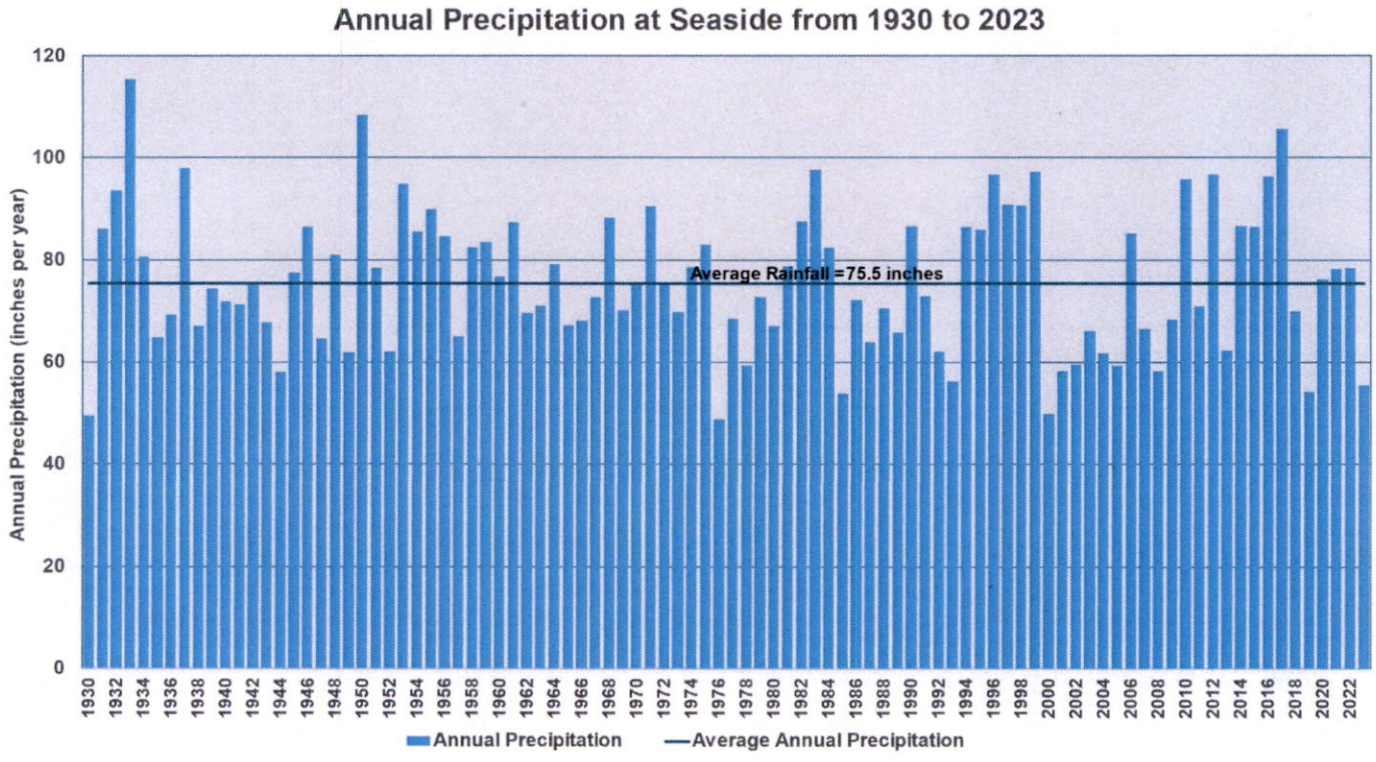
Hydrogeological Cross Section – East-West through Gearhart (Frank, 1970)



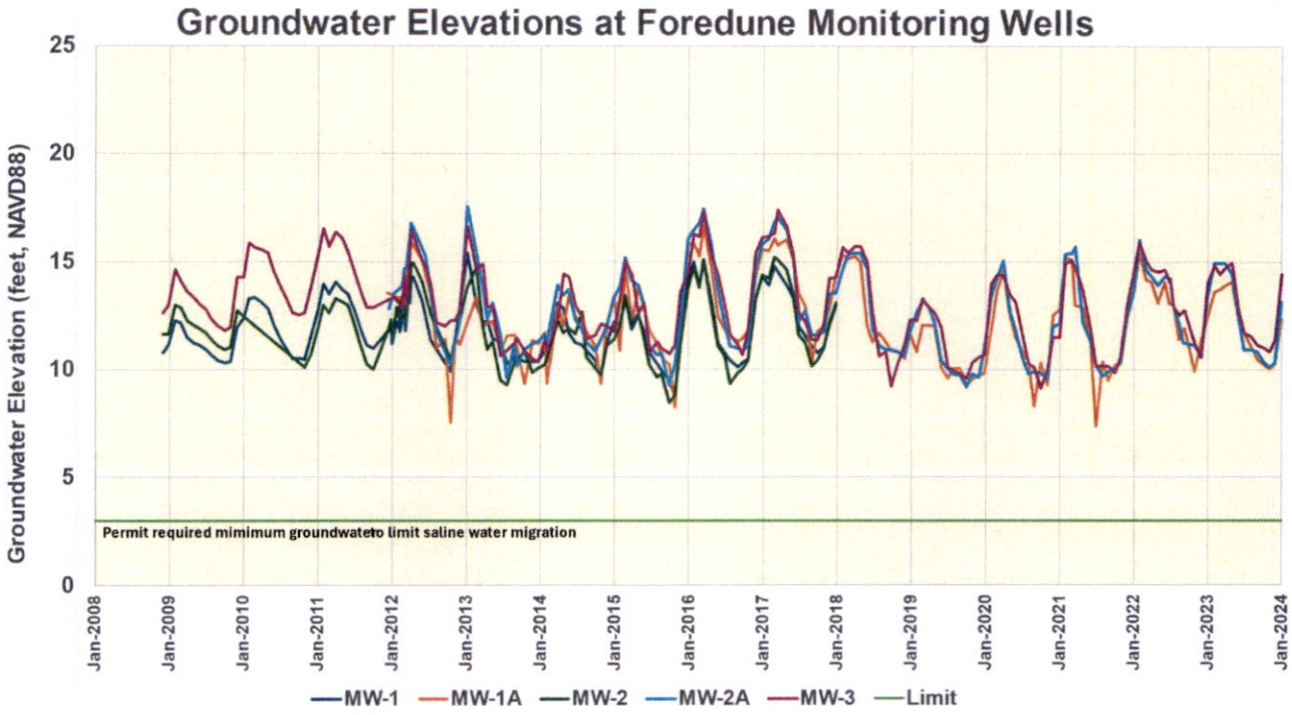
Note: Qd – Dune Sand
Ta – Astoria Formation

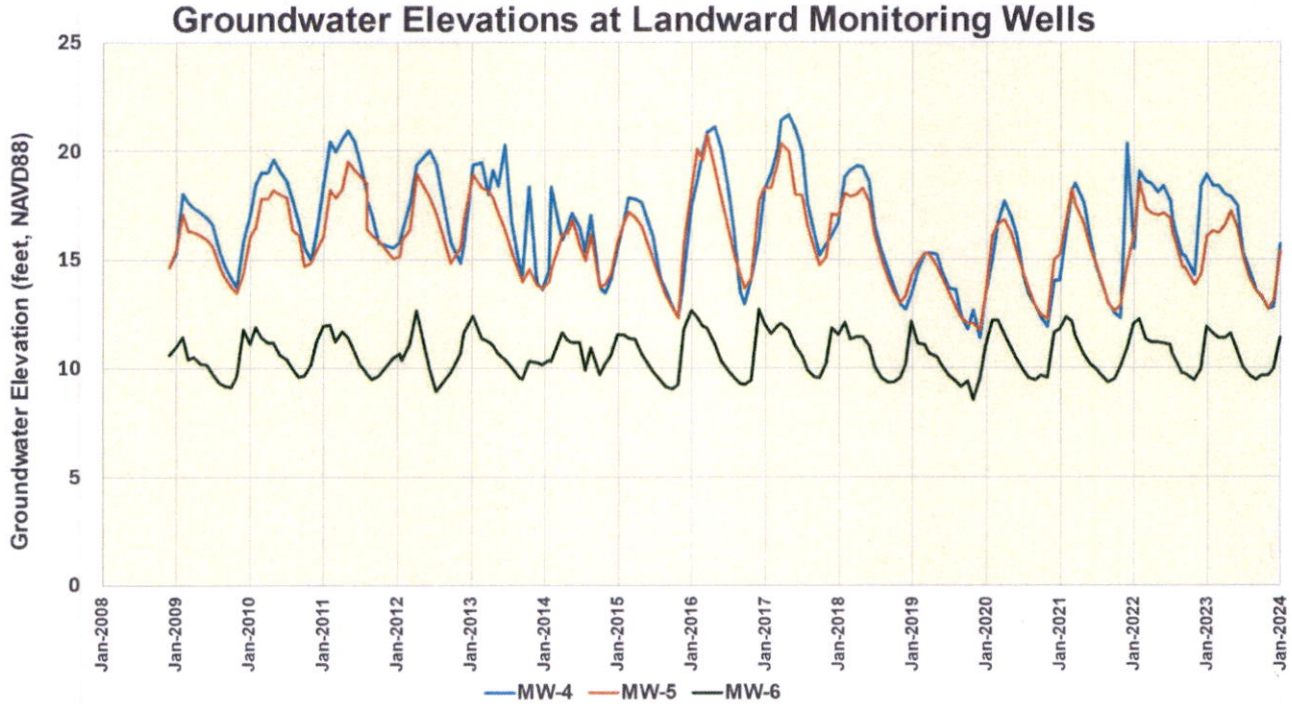
Source: Frank, F.J., 1970, Ground-Water Resources of the Clatsop Plains Sand-Dune Area, Clatsop County, Oregon, USGS Water Supply Paper 1899-A

March 2025	Figure 5 Groundwater Elevation Map and Cross Section across Clatsop Plains
TODD GROUNDWATER	



March 2025	Figure 6 Historical Rainfall from Seaside, Oregon station
TODD GROUNDWATER	

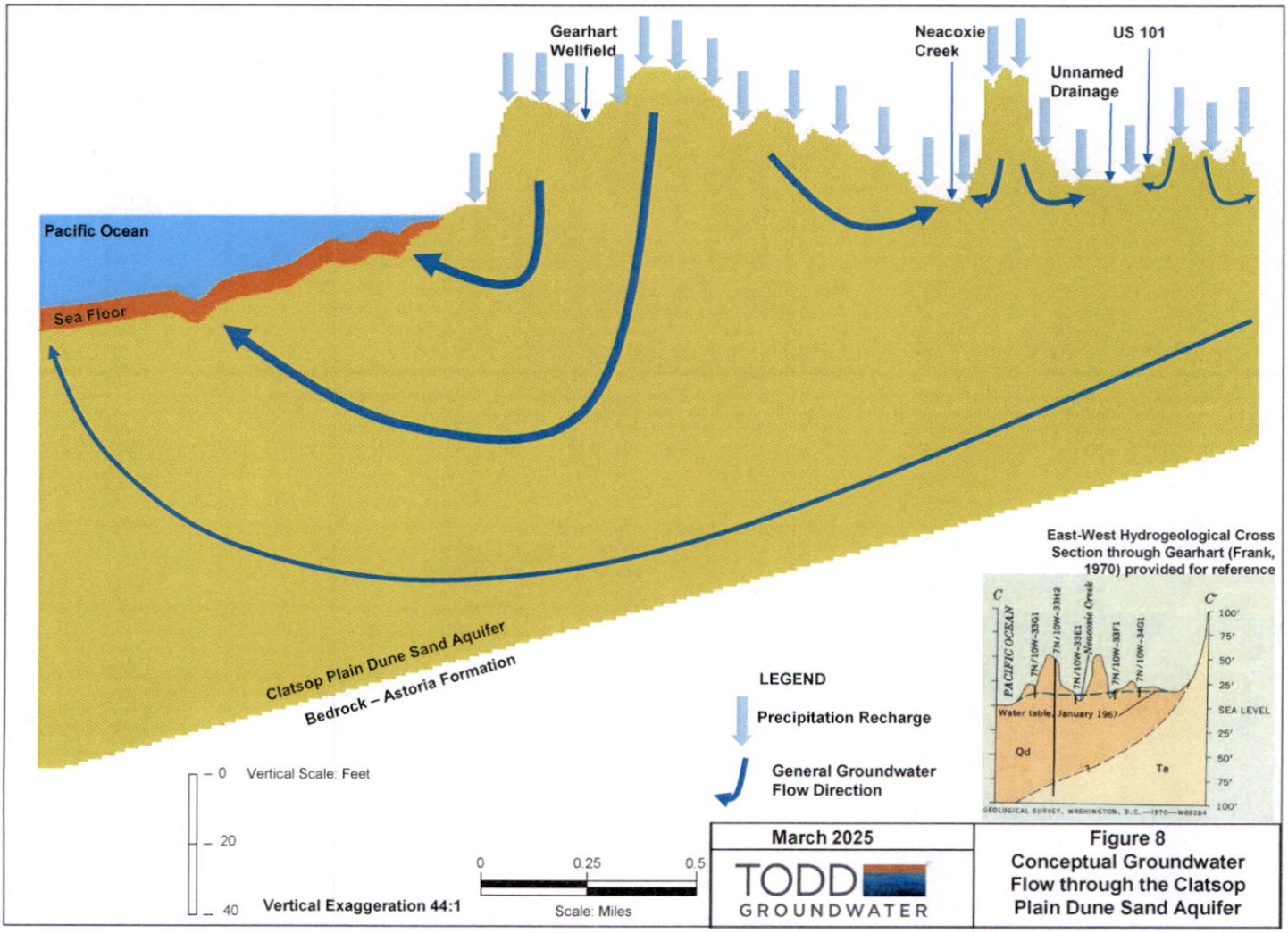




March 2025

TODD GROUNDWATER

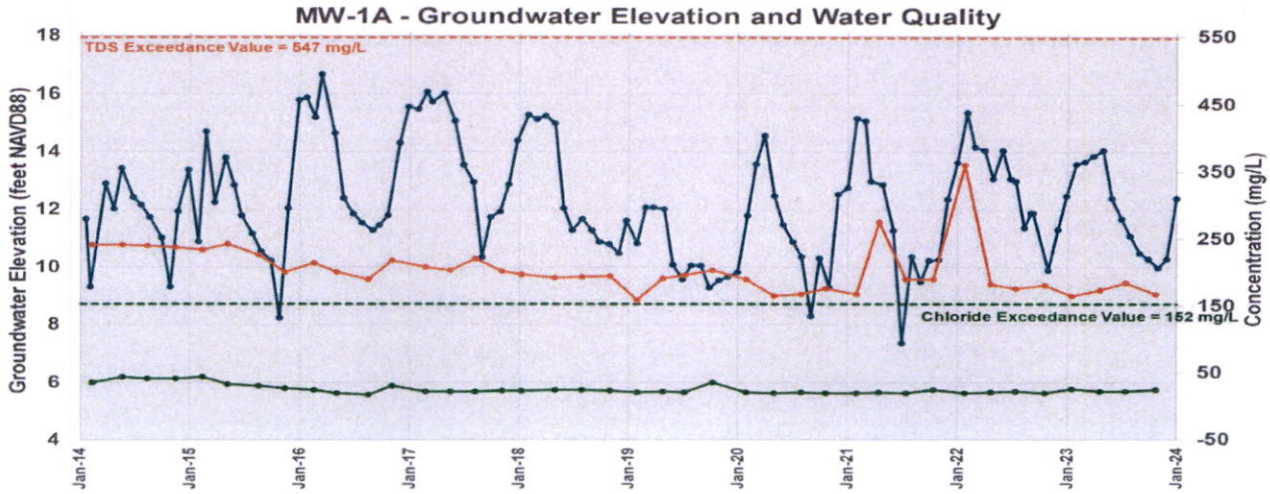
Figure 7
Seasonal Variations in Groundwater Elevations at Gearhart Monitor Wells

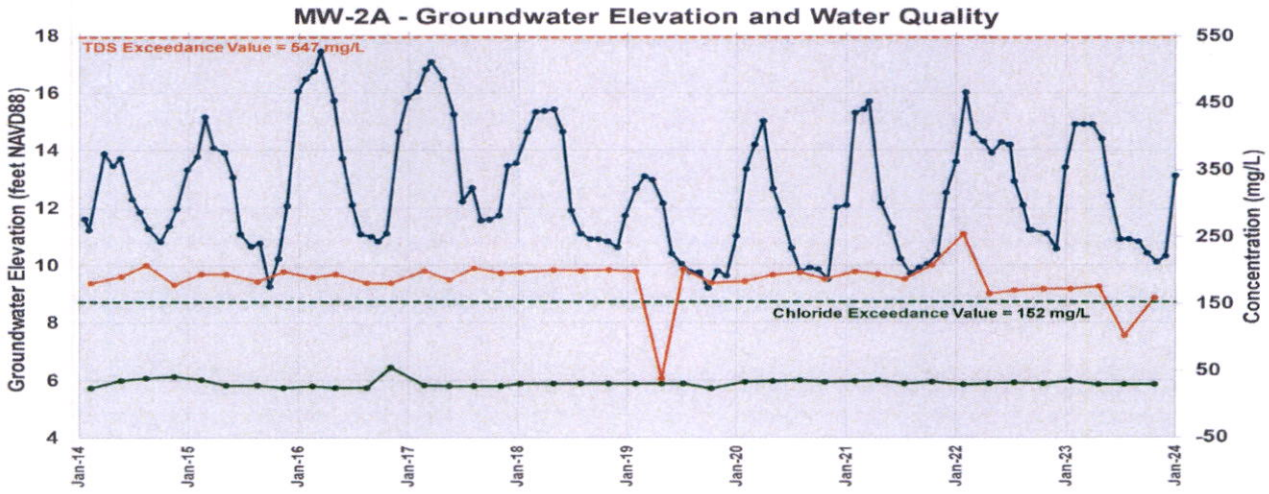


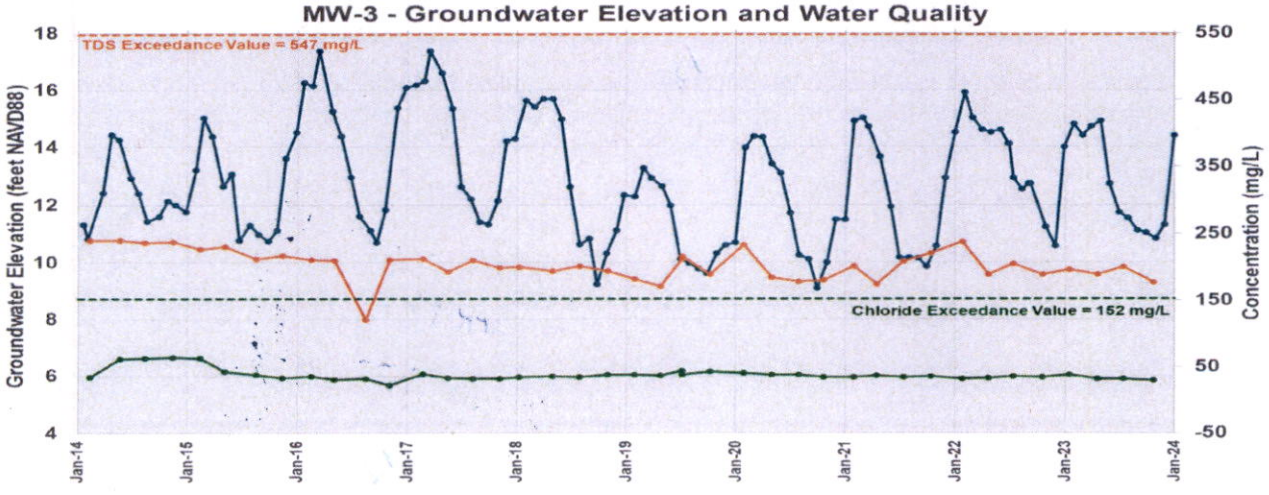
March 2025

TODD GROUNDWATER

Figure 8
Conceptual Groundwater Flow through the Clatsop Plain Dune Sand Aquifer







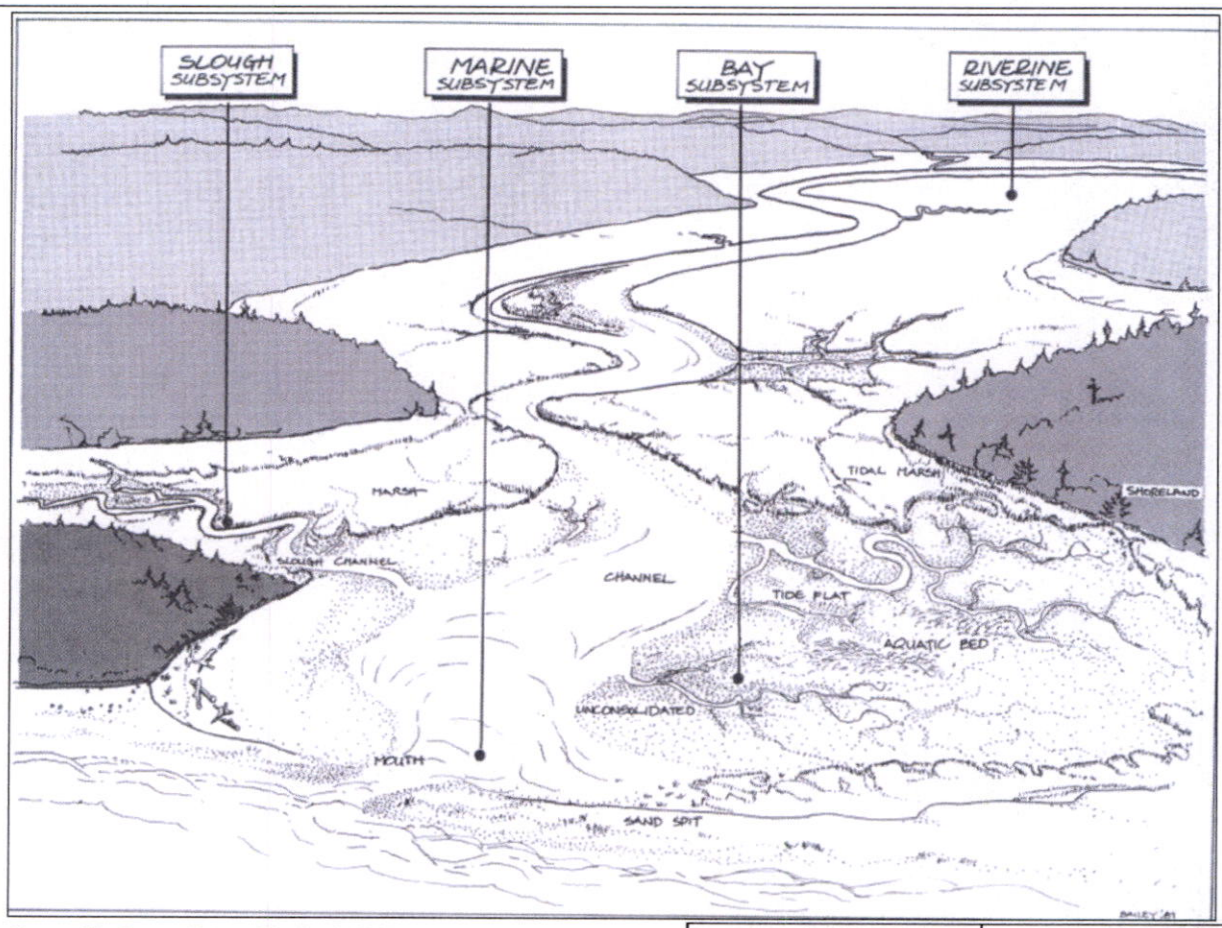
Legend

- Groundwater Elevation
- TDS (mg/L)
- Chloride (mg/L)
- TDS Exceedance Value
- Chloride Exceedance Value

March 2025

TODD GROUNDWATER

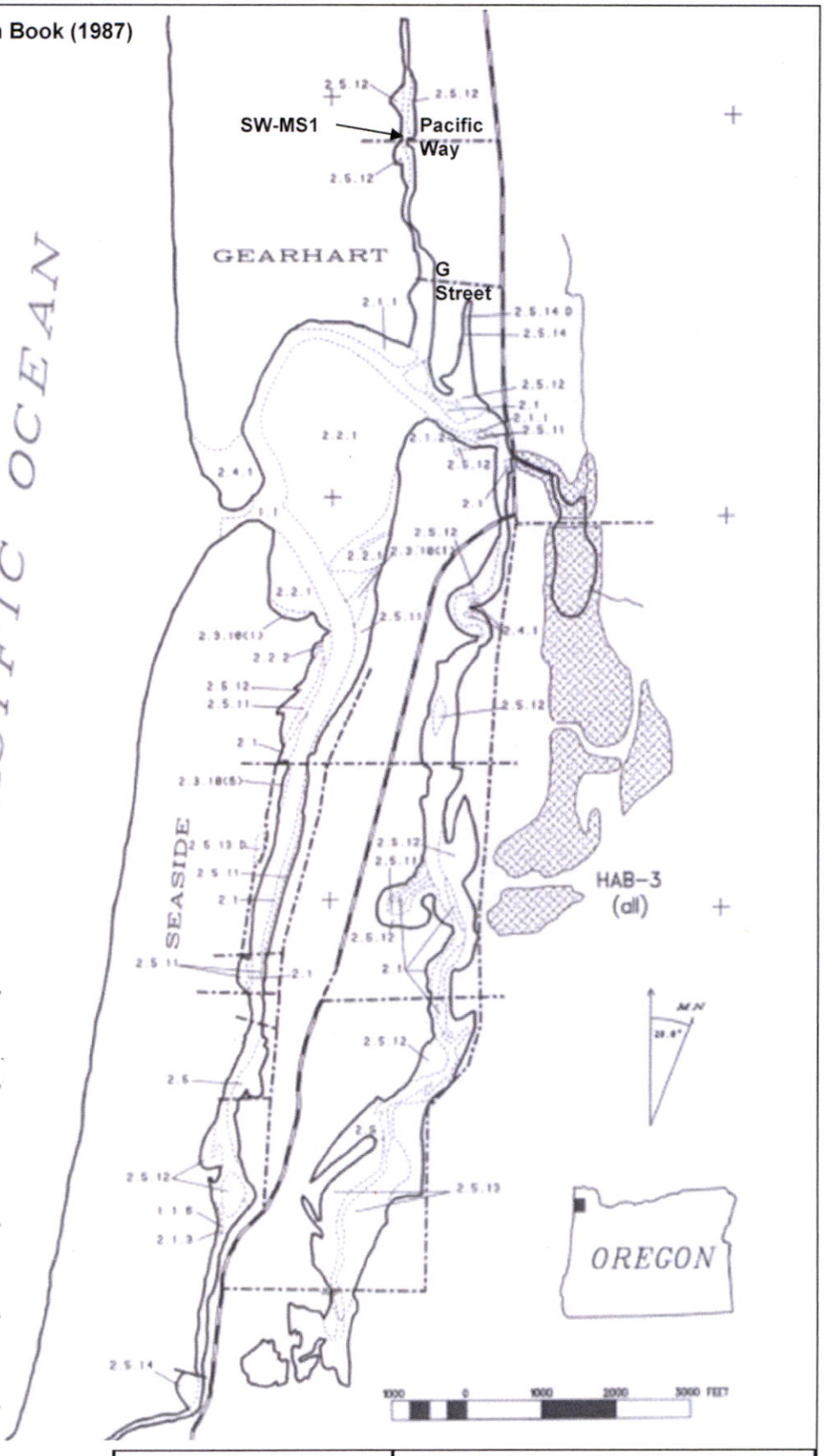
Figure 9
Water Levels and TDS Concentrations in Foredune Monitor Wells



Source: The Oregon Estuary Plan Book (1987)

March 2025	Figure 10 Four Major Habitat Subsystems of Estuaries on the Oregon Coast
TODD GROUNDWATER	

Source: The Oregon Estuary Plan Book (1987)



LEGEND

ALL HABITATS

UNCONSOLIDATED BOTTOM	
1.1	Unspecified Type
1.1.6	Cobble/Gravel
SHORE	
2.1	Unspecified Type
2.1.1	Sand
2.1.2	Sand/Mud (Mixed)
2.1.3	Mud
FLAT	
2.2.1	Sand
2.2.2	Sand/Mud (Mixed)
AQUATIC BED	
2.3.10(1)	Algae on Sand
2.3.10(6)	" on Cobble/Gravel
BEACH/BAR	
2.4.1	Sand
TIDAL MARSH	
2.5.11	Low Salt Marsh
2.5.12	High Salt Marsh
2.5.13	Fresh Marsh
2.5.14	Shrub Marsh

March 2025

TODD GROUNDWATER

Figure 11
Distribution of Estuarine Habitat Subsystems in the Necanicum River Estuary

Neacoxie Creek General Tidal Influence Characteristics

- Creek Outflow — Daily tidal influence
- Lower Creek – salt marsh — Daily tidal influence
- Lower Mid Creek – salt marsh — Weekly tidal influence
- Upper Mid Creek – fresh-water marsh — Highest high tide influence
- Upper Creek – beyond tidal Influence
- Tidal Flat Sand Habitat

N

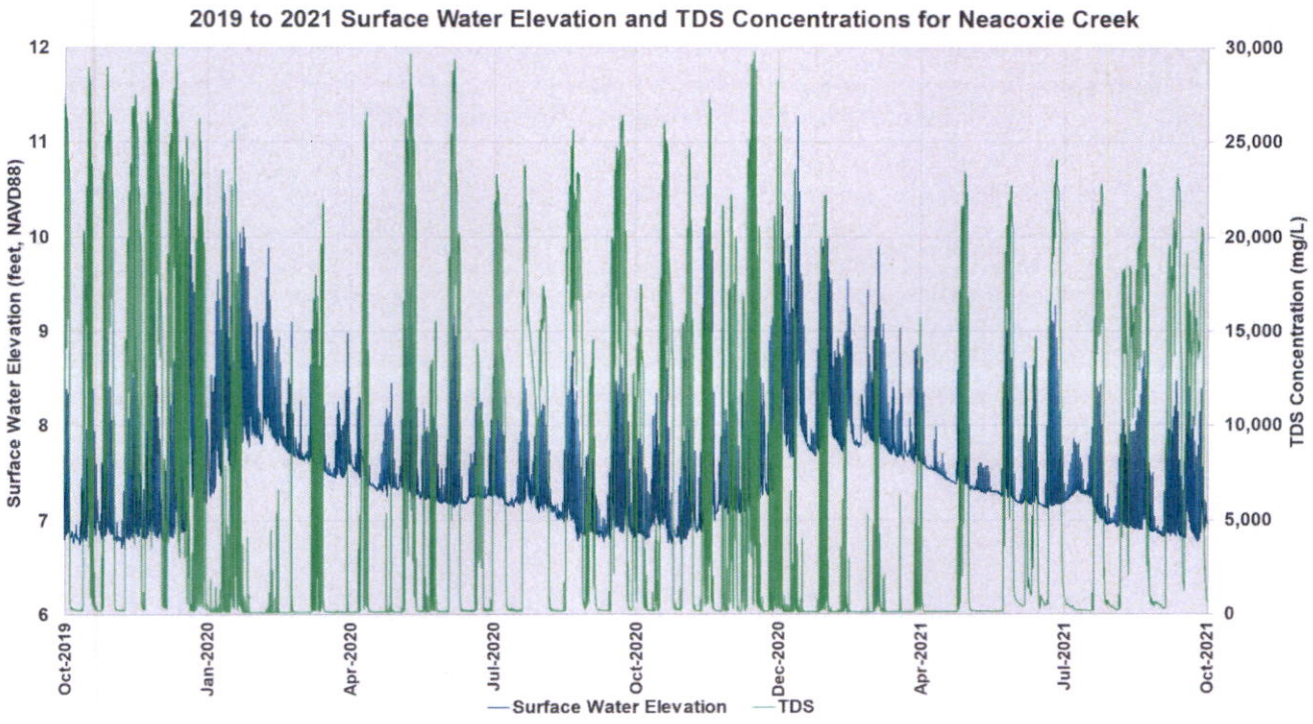
0 0.25 0.5

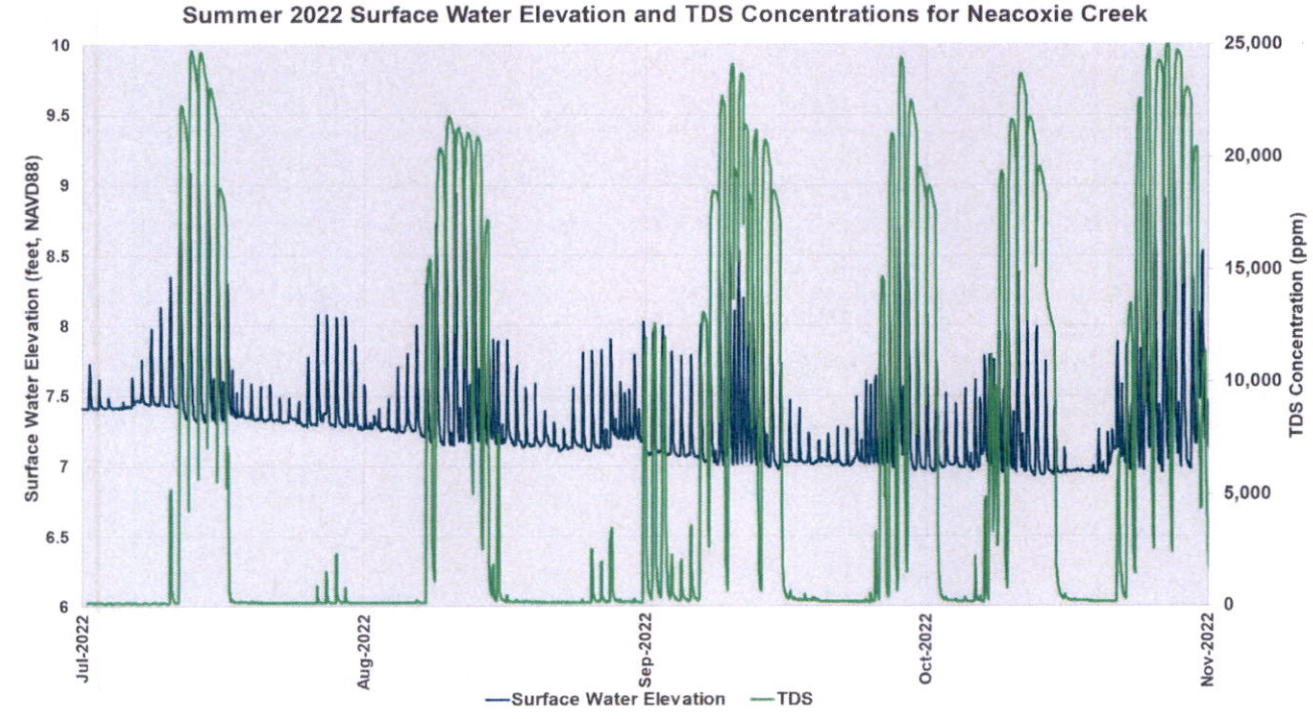
Scale: Miles

March 2025

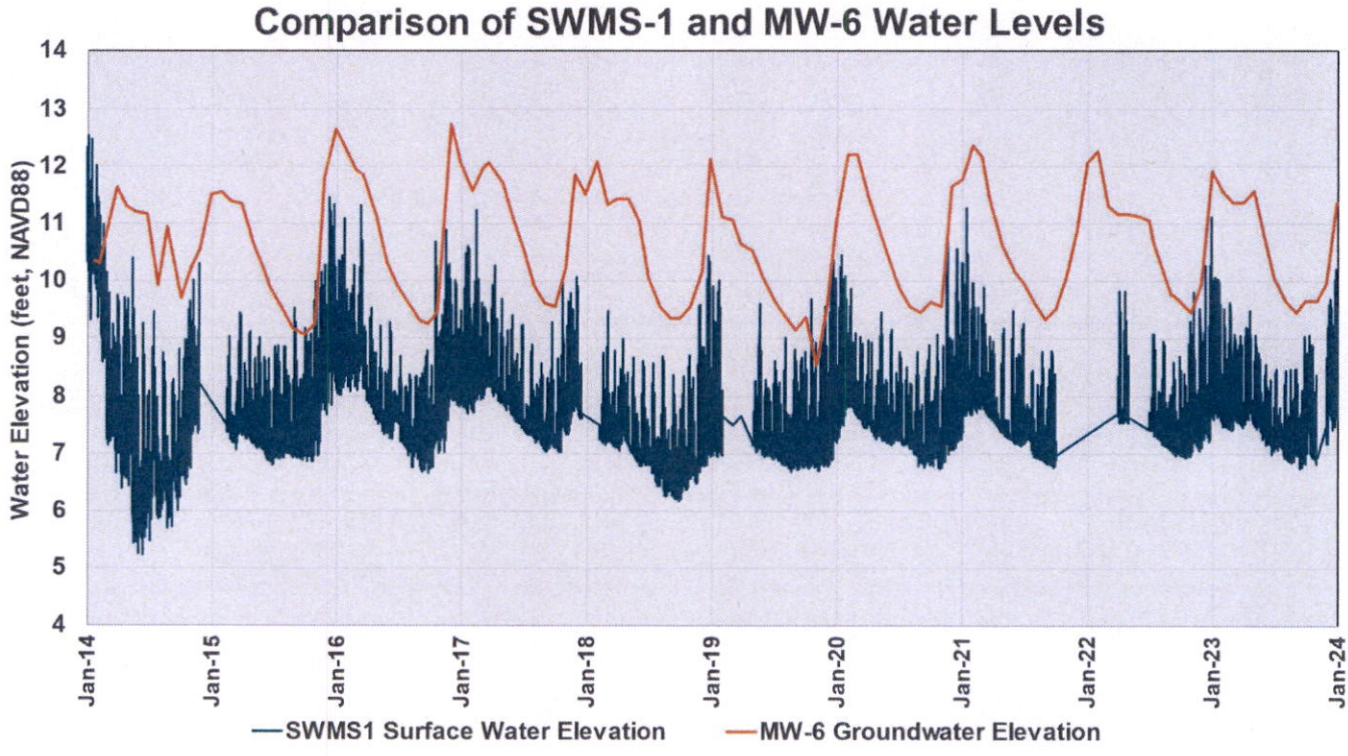
TODD GROUNDWATER

Figure 12
Neacoxie Creek Estimated Extent of Tidal Influence

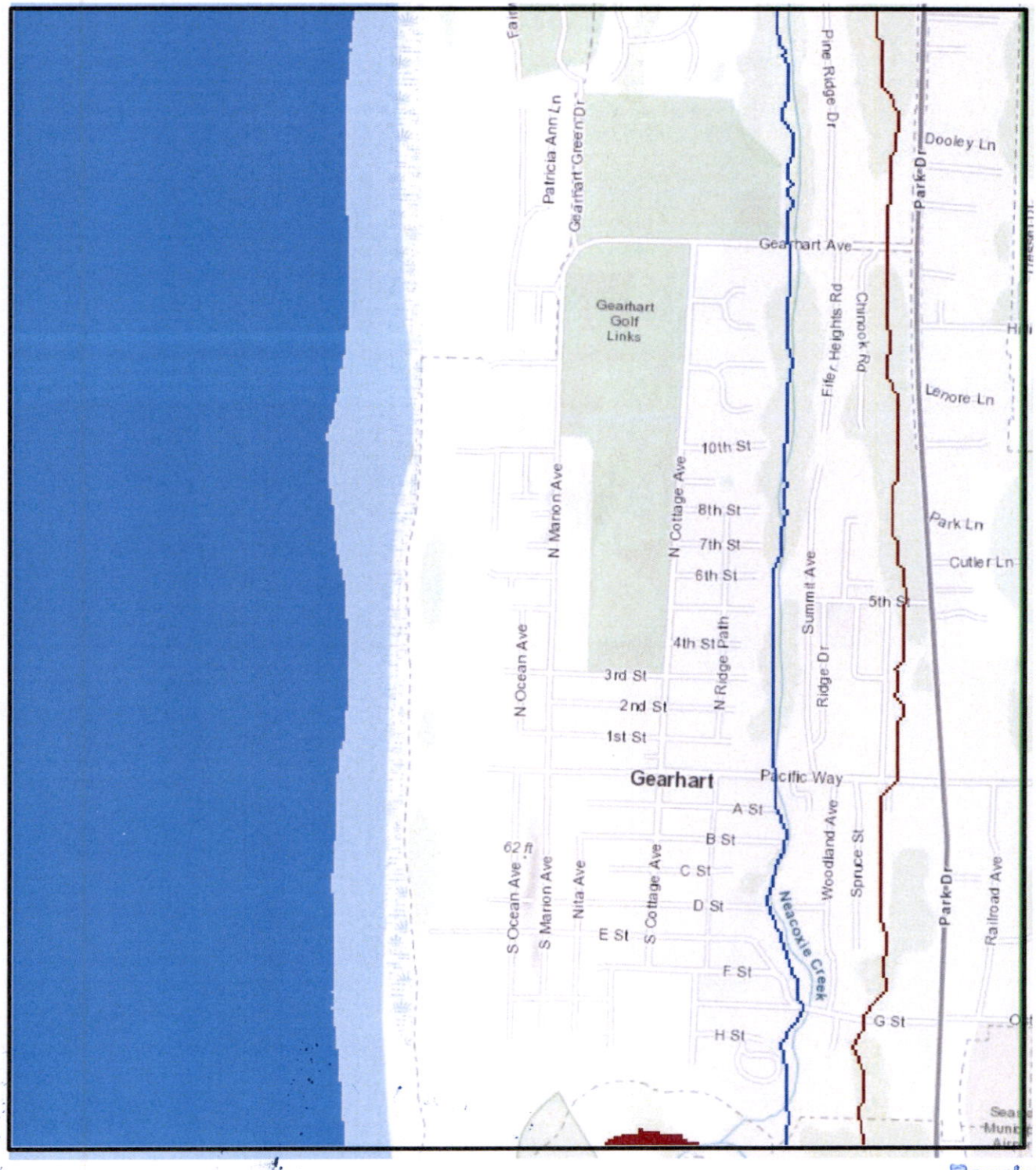




March 2025	Figure 13 Water Levels and TDS Concentrations in Neacoxie Creek
TODD GROUNDWATER	



March 2025	Figure 14 Comparison of SWMS-1 and MW-6 Water Levels
TODD GROUNDWATER	



LEGEND

- Constant Head Boundary (Pacific Ocean)
- River Package (Neacoxie Creek)
- General Head Boundary (Eastern Flow Boundary)
- Drain Boundary (Neawanna Creek)
- Drain Boundary (Unnamed Drainage)
- Model Grid Boundary (Model Extent)

N

0 0.25 0.5

Scale: Miles

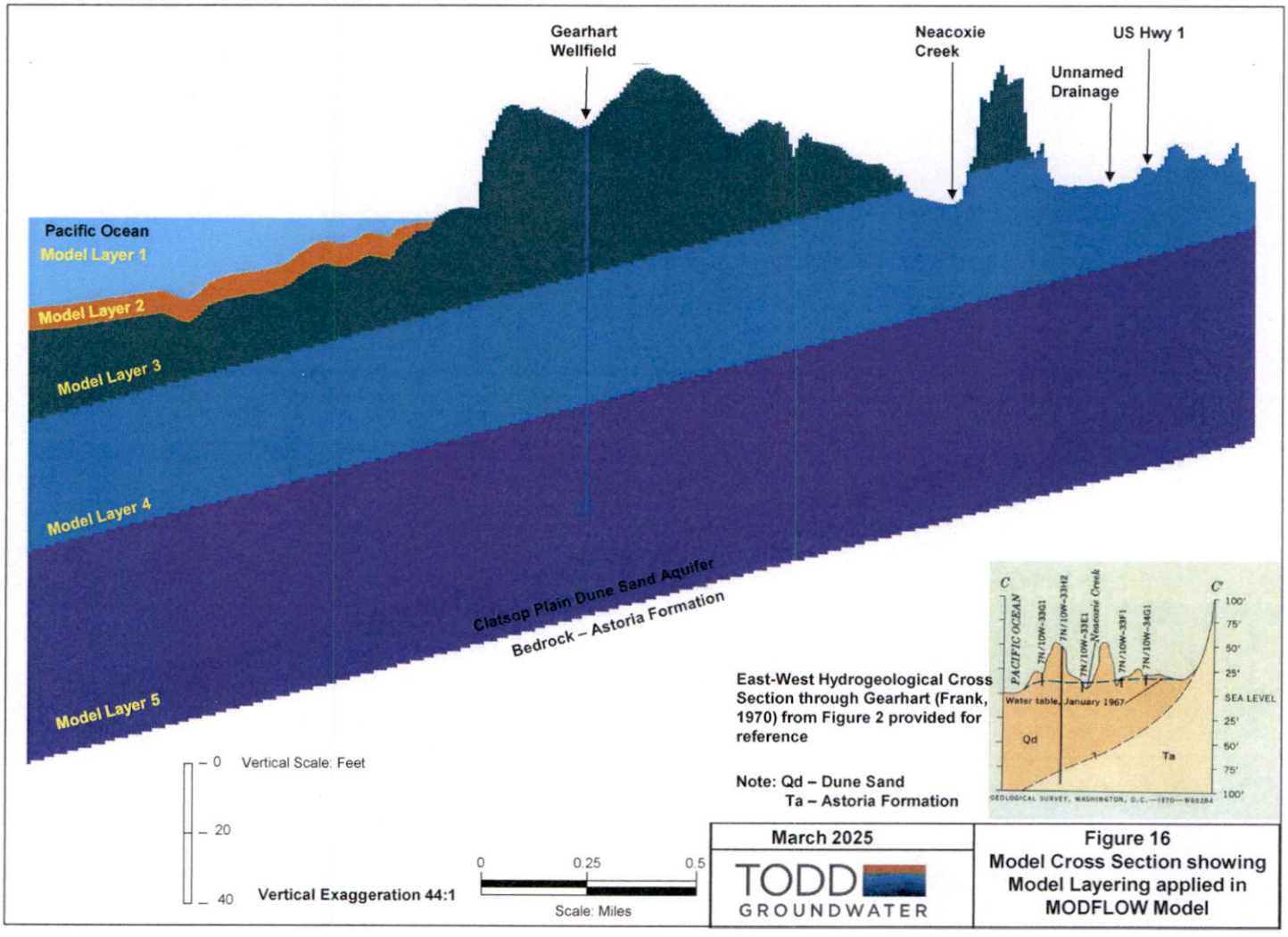
March 2025

TODD GROUNDWATER

Figure 15
MODFLOW Model Domain with Key Hydrologic Features

Received
APR 21 2025
OWRD

Received
MAY 05 2025
OWRD



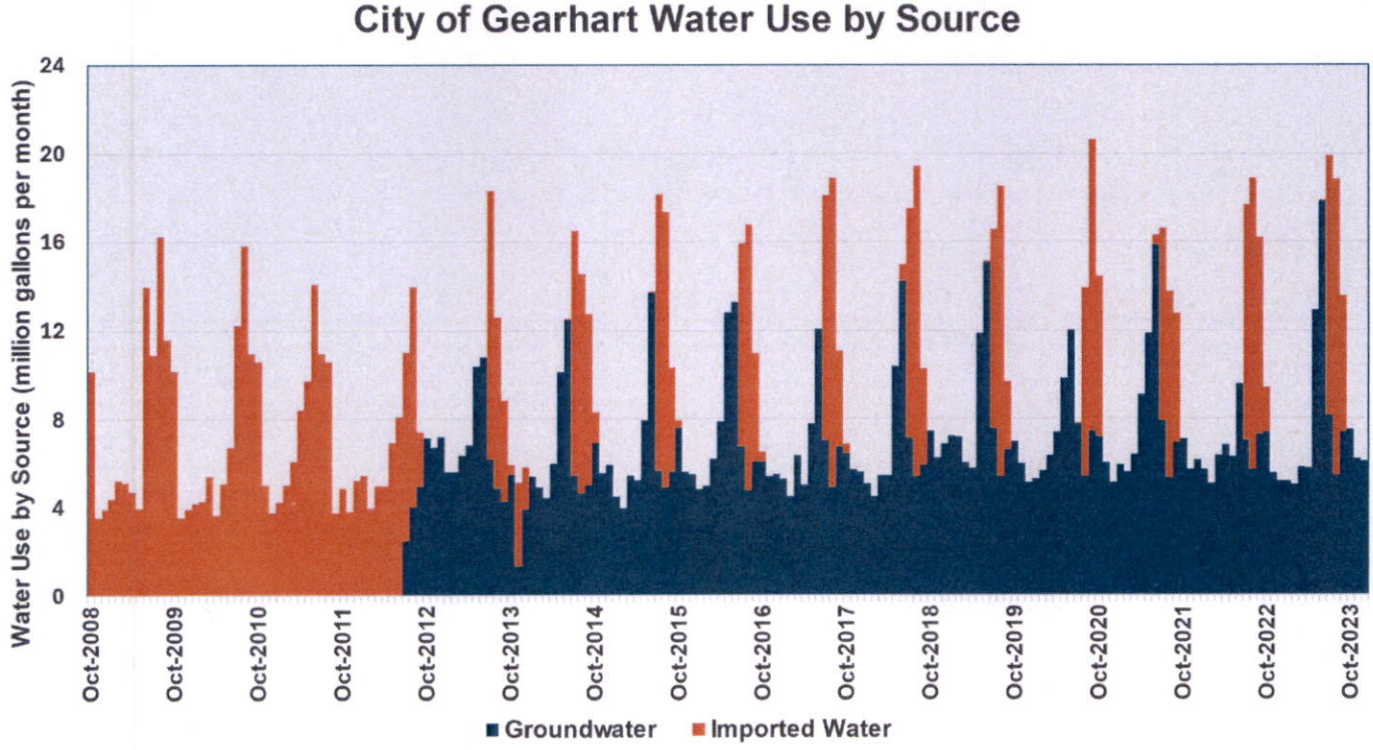
East-West Hydrogeological Cross Section through Gearhart (Frank, 1970) from Figure 2 provided for reference

Note: Qd – Dune Sand
Ta – Astoria Formation

March 2025

TODD GROUNDWATER

Figure 16
Model Cross Section showing Model Layering applied in MODFLOW Model



March 2025	Figure 17 Gearhart Total Water Use and Groundwater Pumping 2009 to 2023
TODD GROUNDWATER	

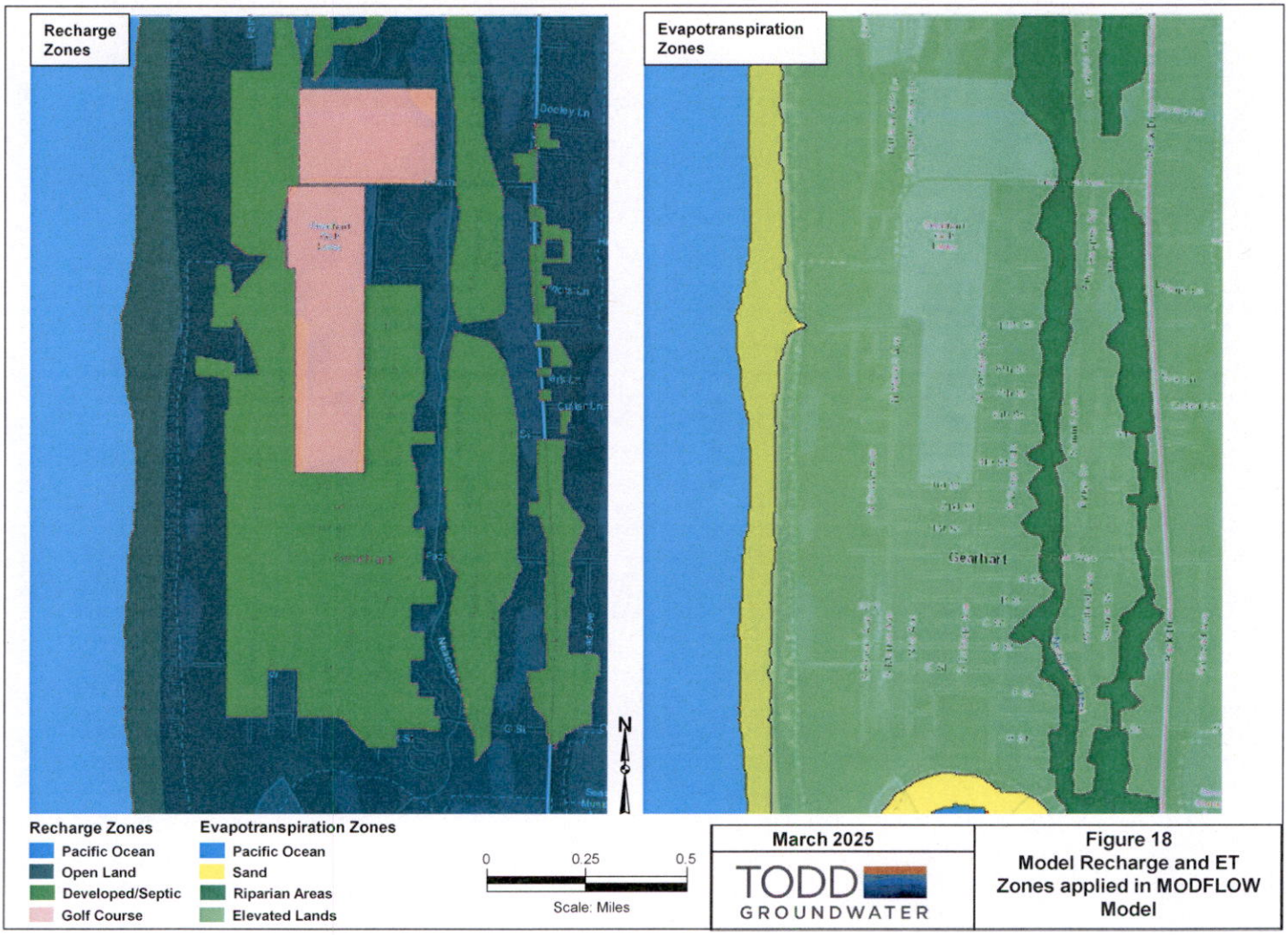
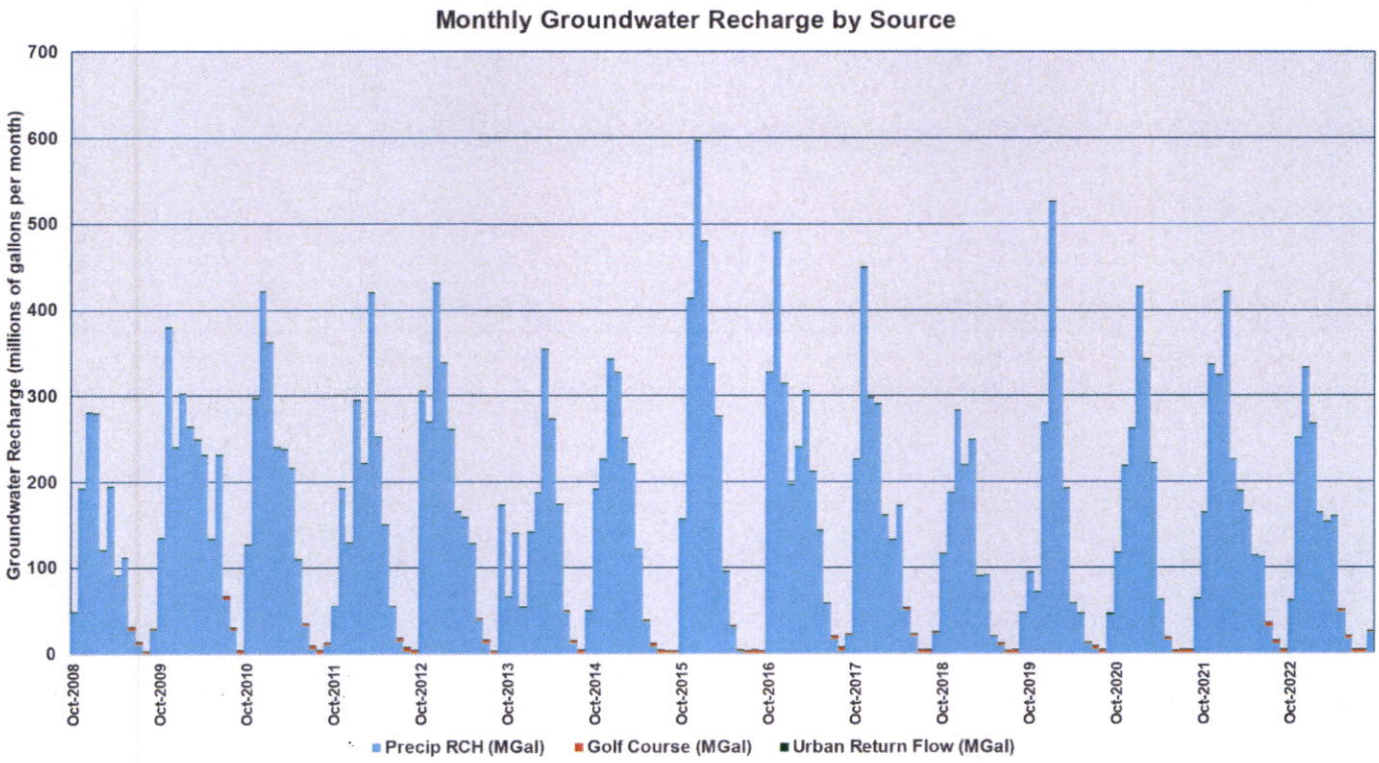
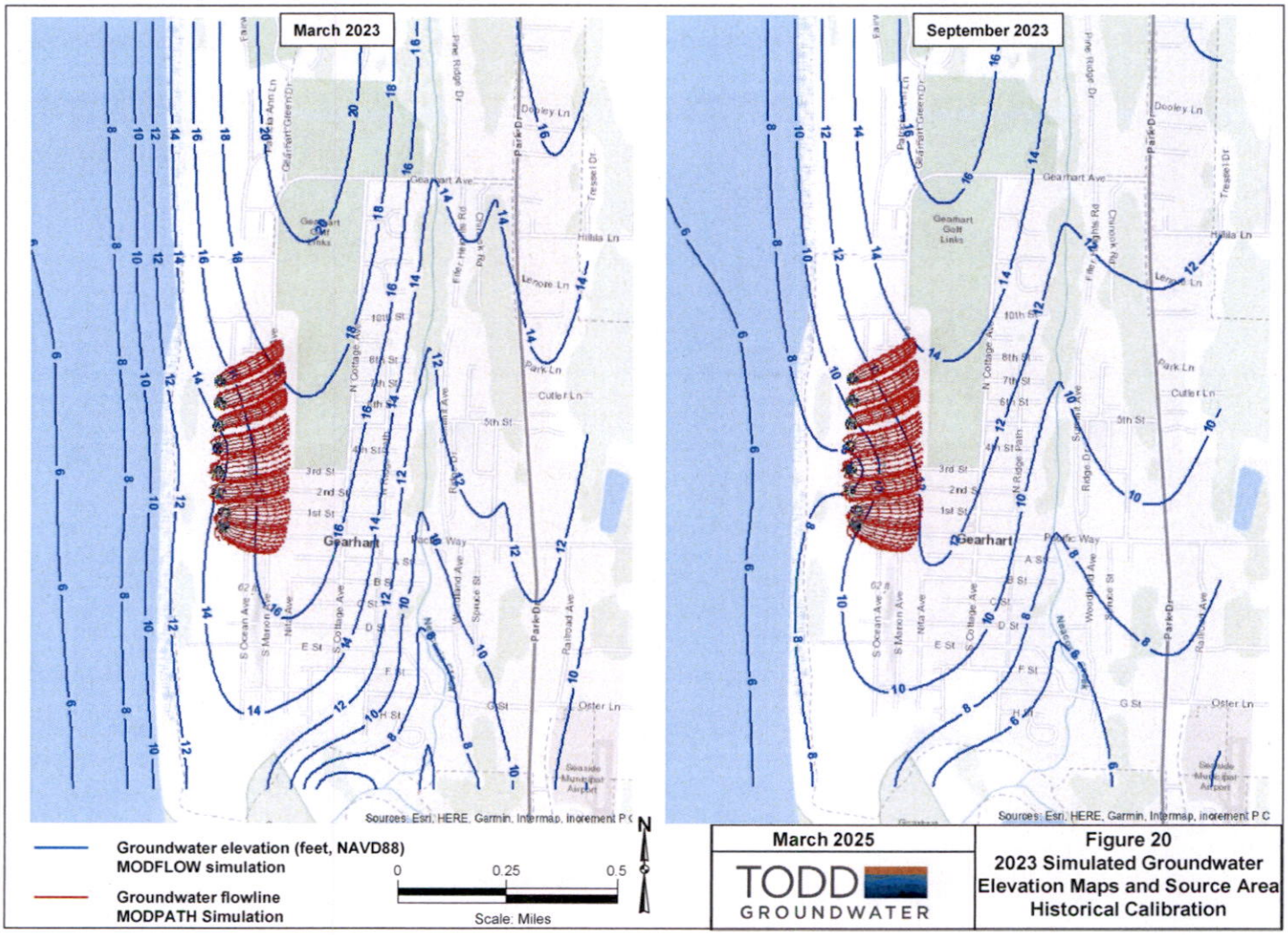
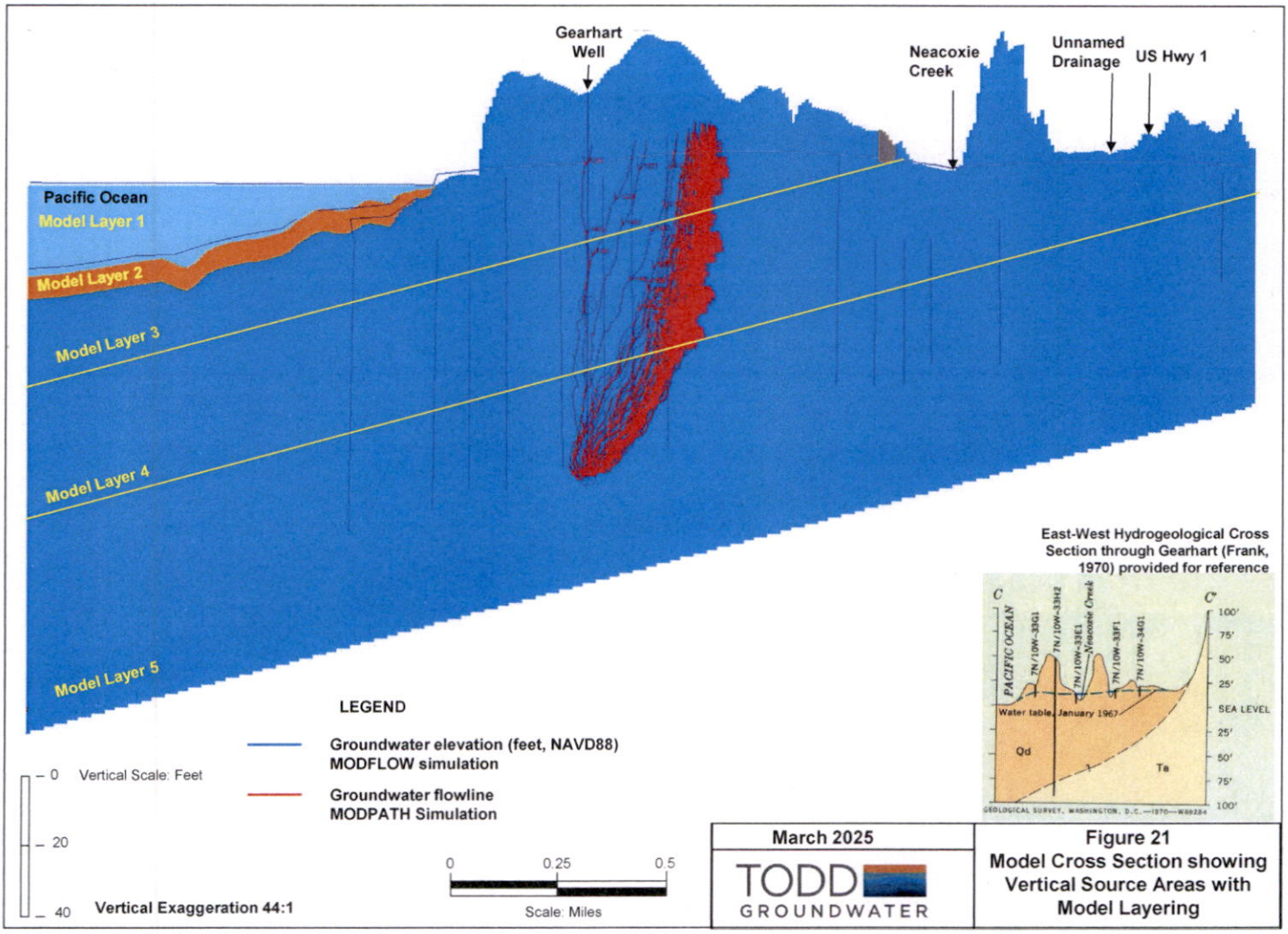


Figure 18
Model Recharge and ET Zones applied in MODFLOW Model



March 2025	Figure 19 Estimated Groundwater Recharge by Source applied in MODFLOW Model
TODD GROUNDWATER	

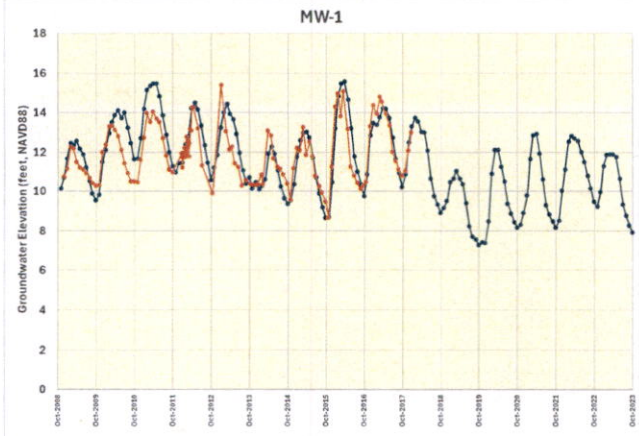


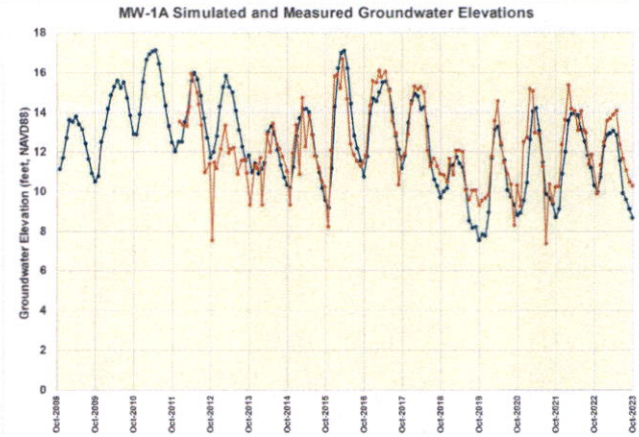


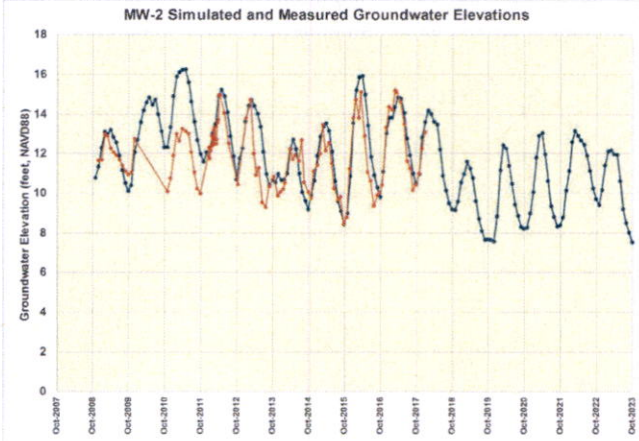
March 2025

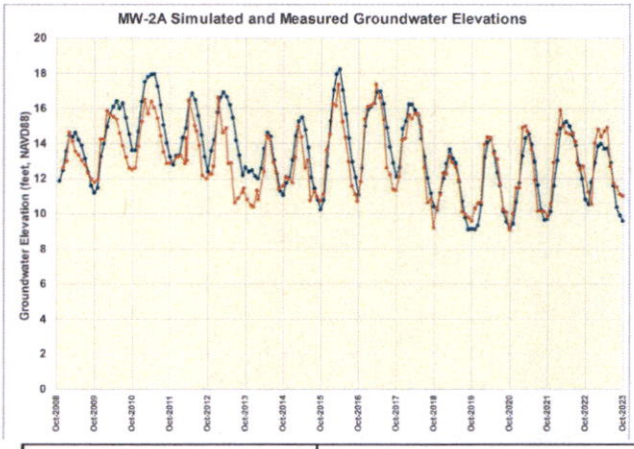
TODD GROUNDWATER

Figure 21
Model Cross Section showing Vertical Source Areas with Model Layering





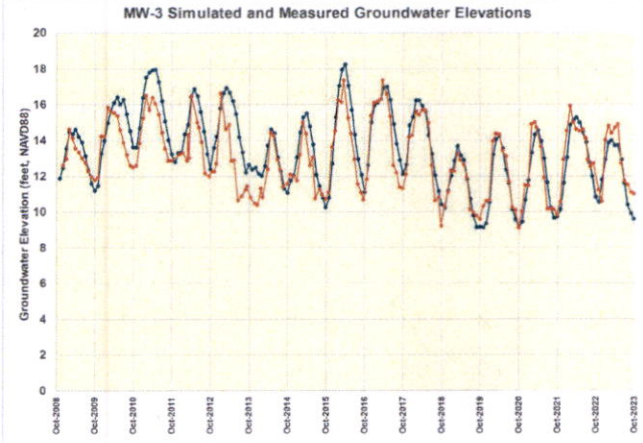


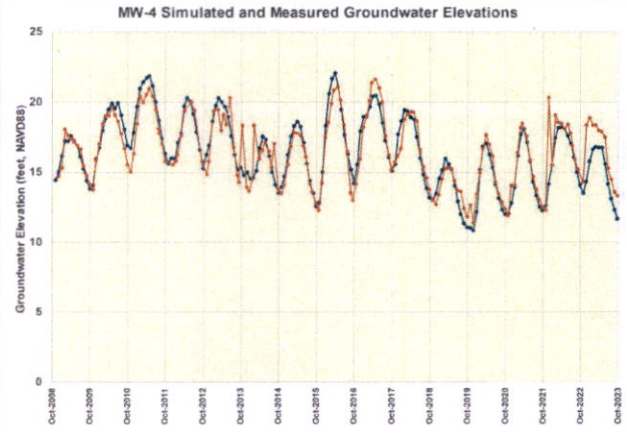


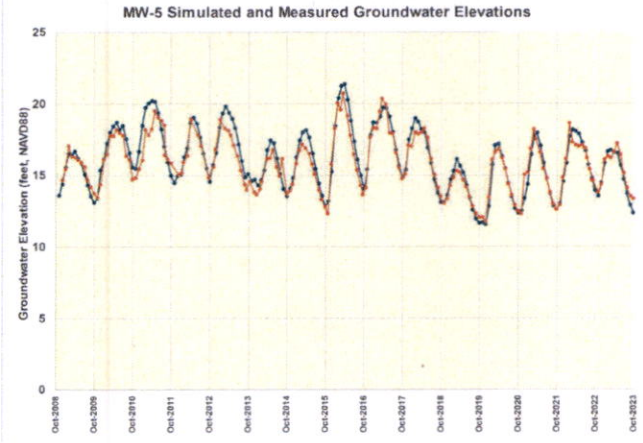
Legend

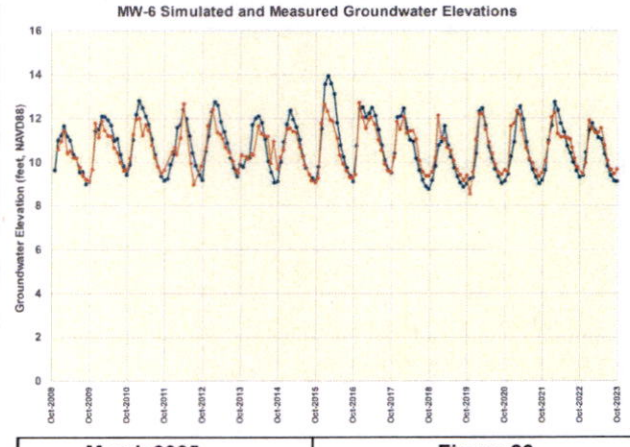
- Calibration
- Measured Data

March 2025	Figure 22 Historical Calibration Simulated vs. Measured Groundwater Levels Set 1
TODD GROUNDWATER	





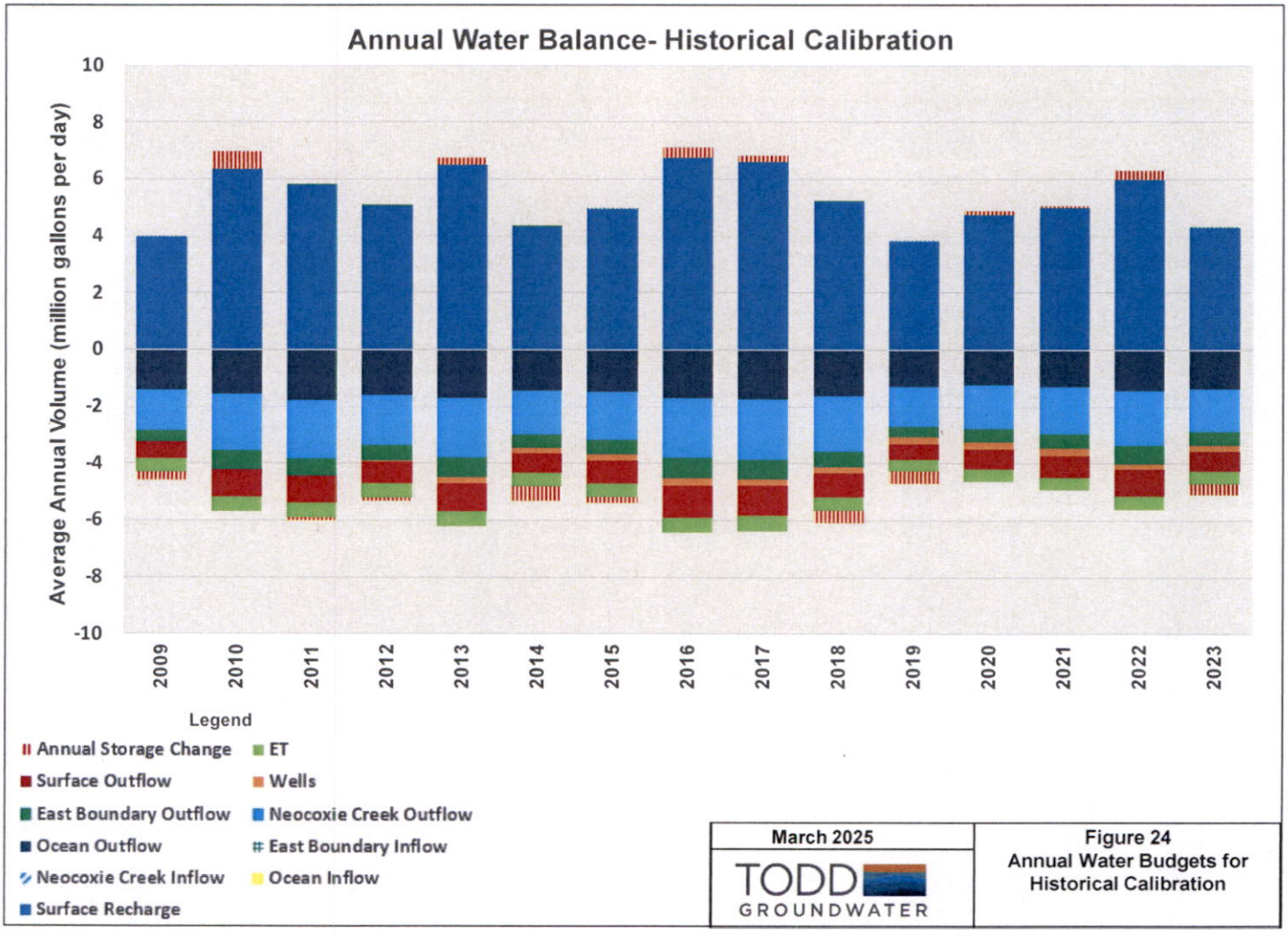




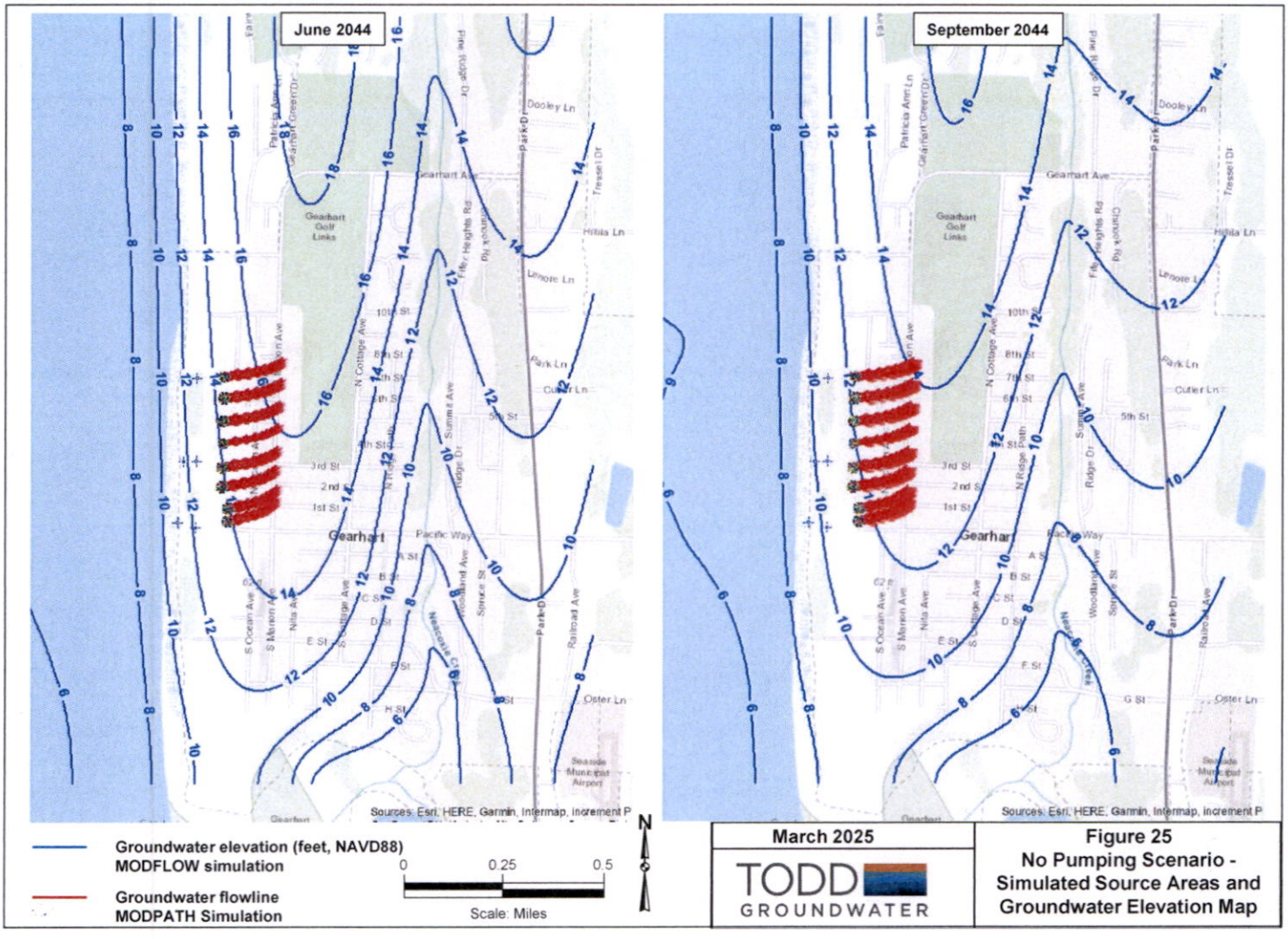
Legend

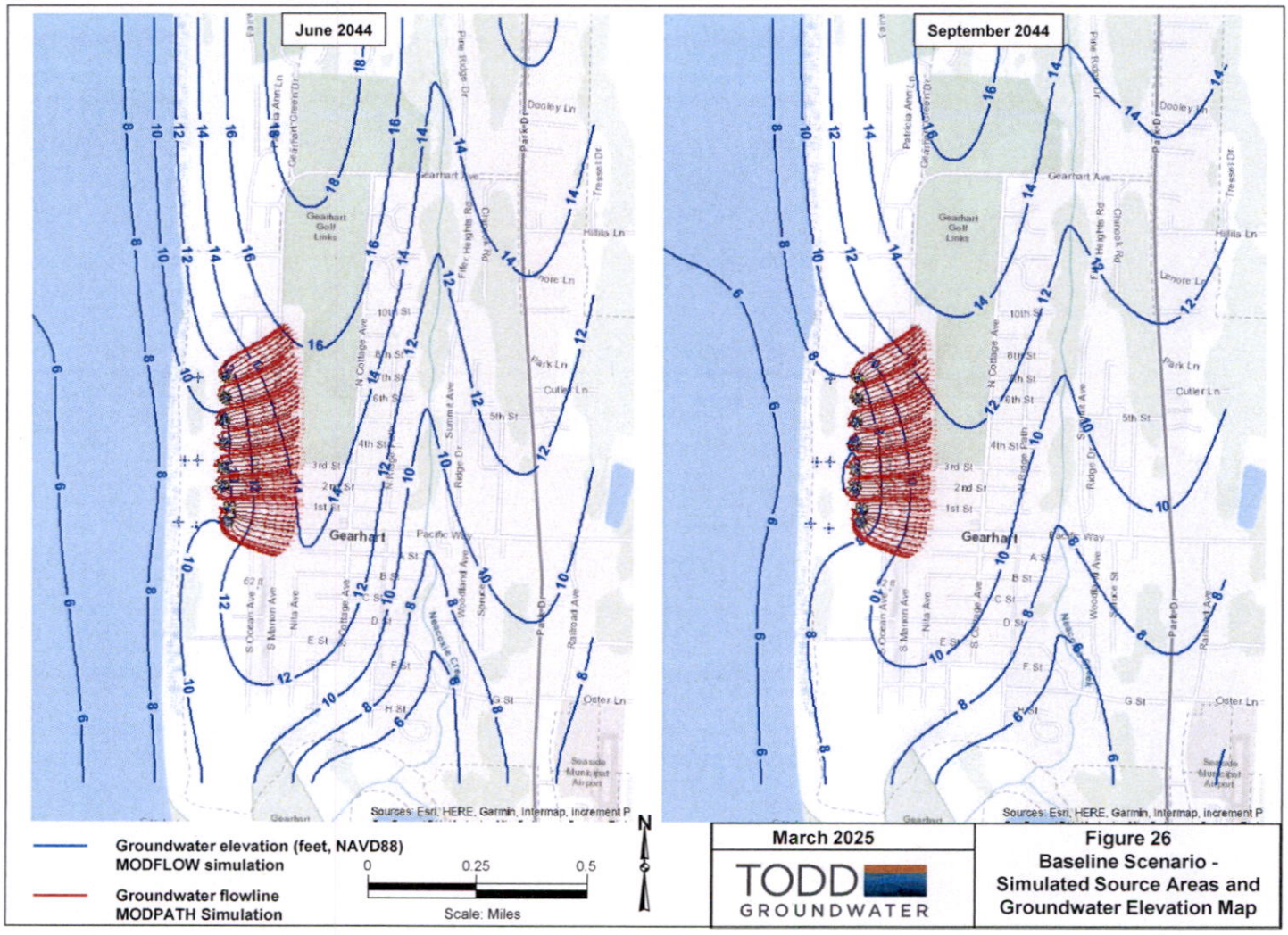
- Calibration
- Measured Data

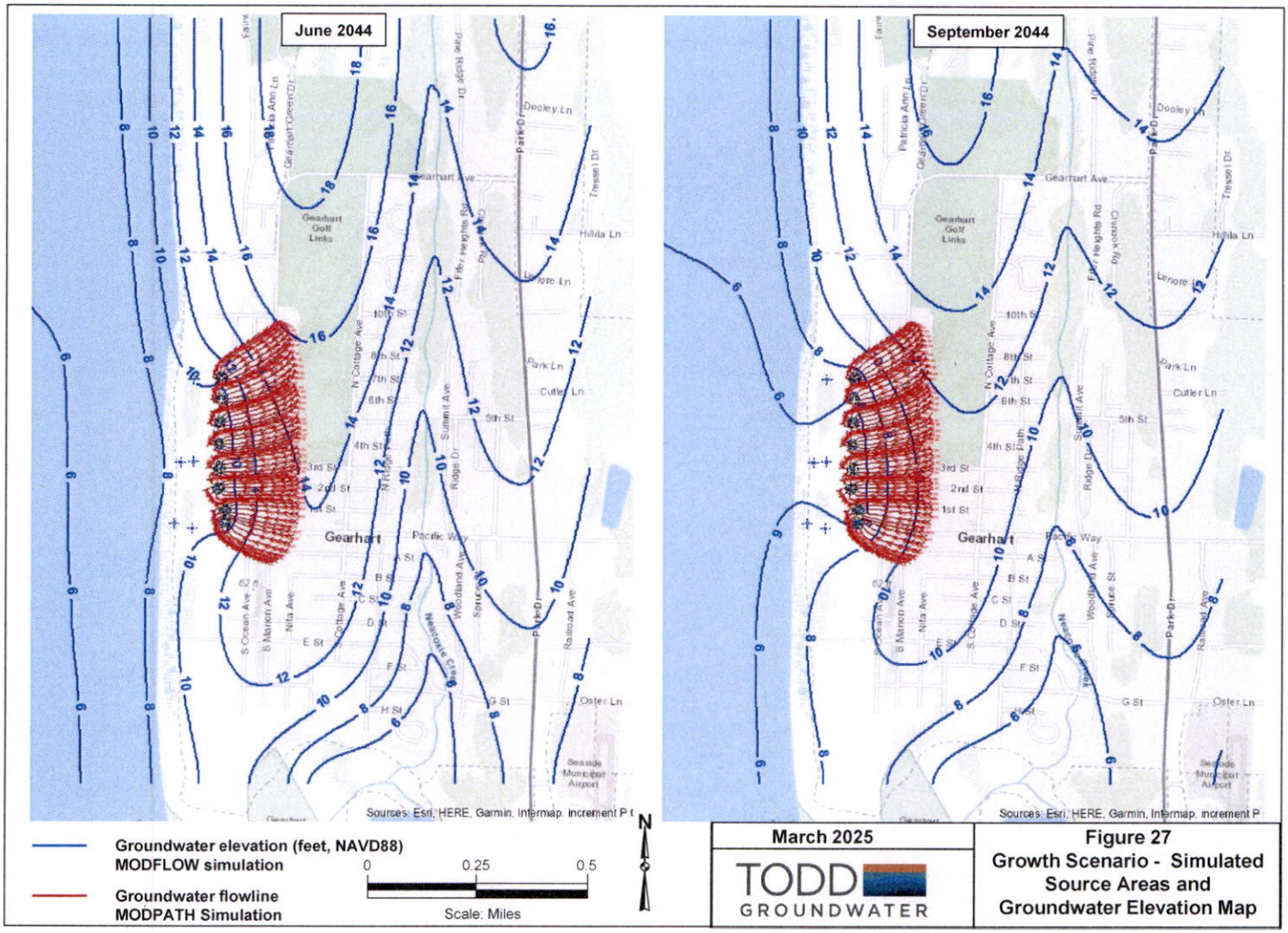
March 2025	Figure 23 Historical Calibration Simulated vs. Measured Groundwater Levels Set 2
TODD GROUNDWATER	

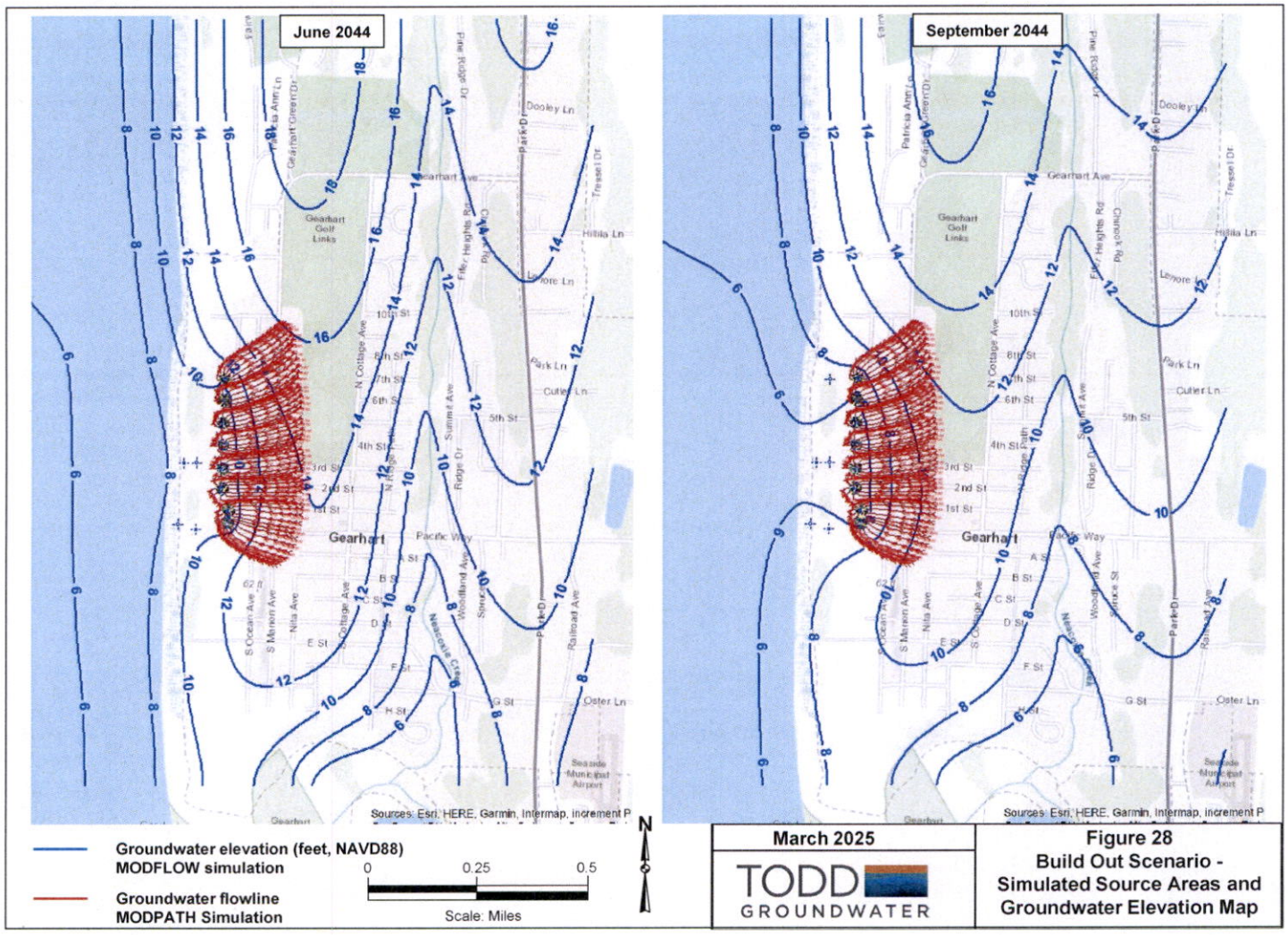


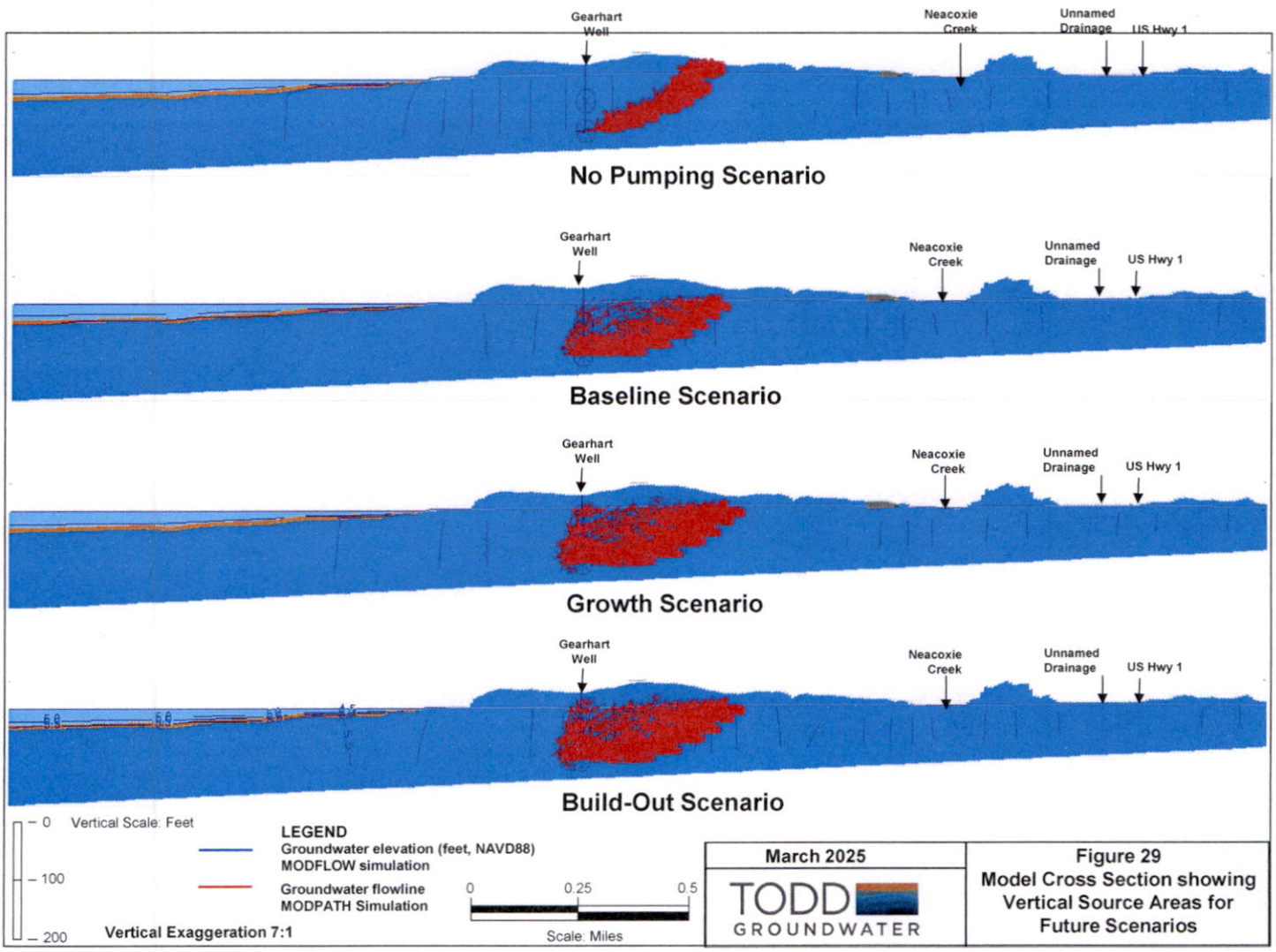
March 2025	Figure 24 Annual Water Budgets for Historical Calibration
TODD GROUNDWATER	







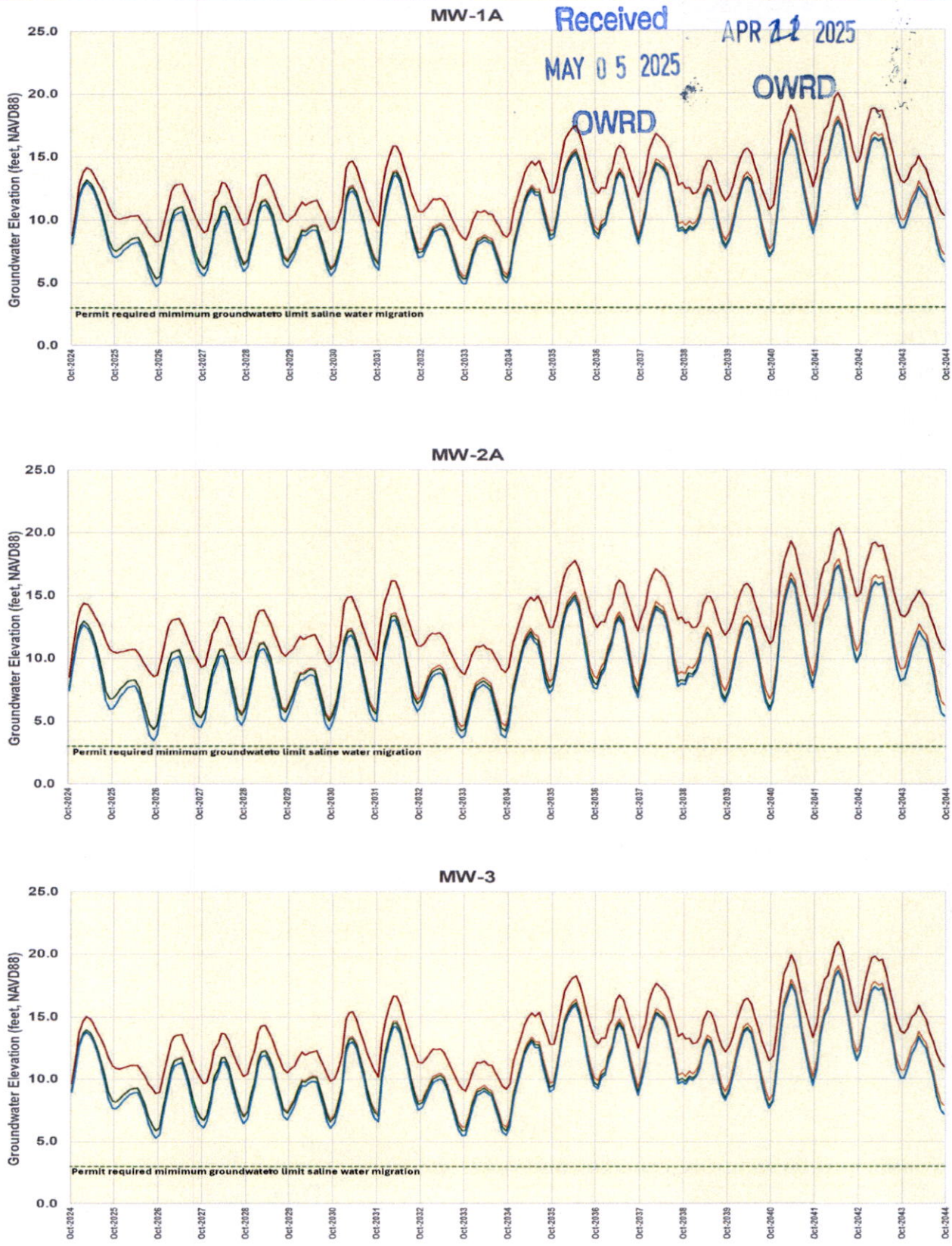




March 2025

TODD GROUNDWATER

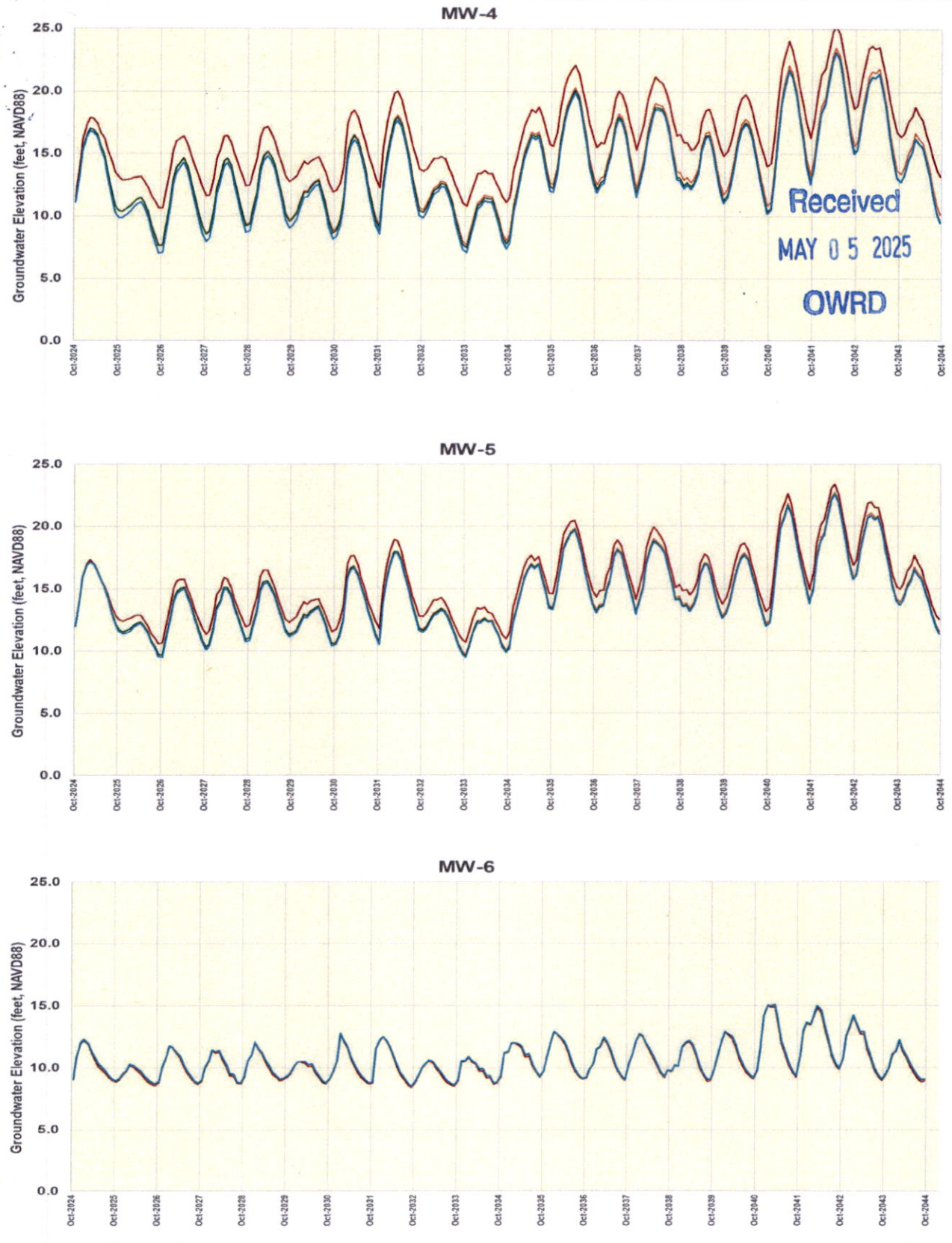
Figure 29
Model Cross Section showing Vertical Source Areas for Future Scenarios



March 2025

TODD GROUNDWATER

Figure 30
Water Levels and TDS Concentrations in Foredune Monitoring Wells



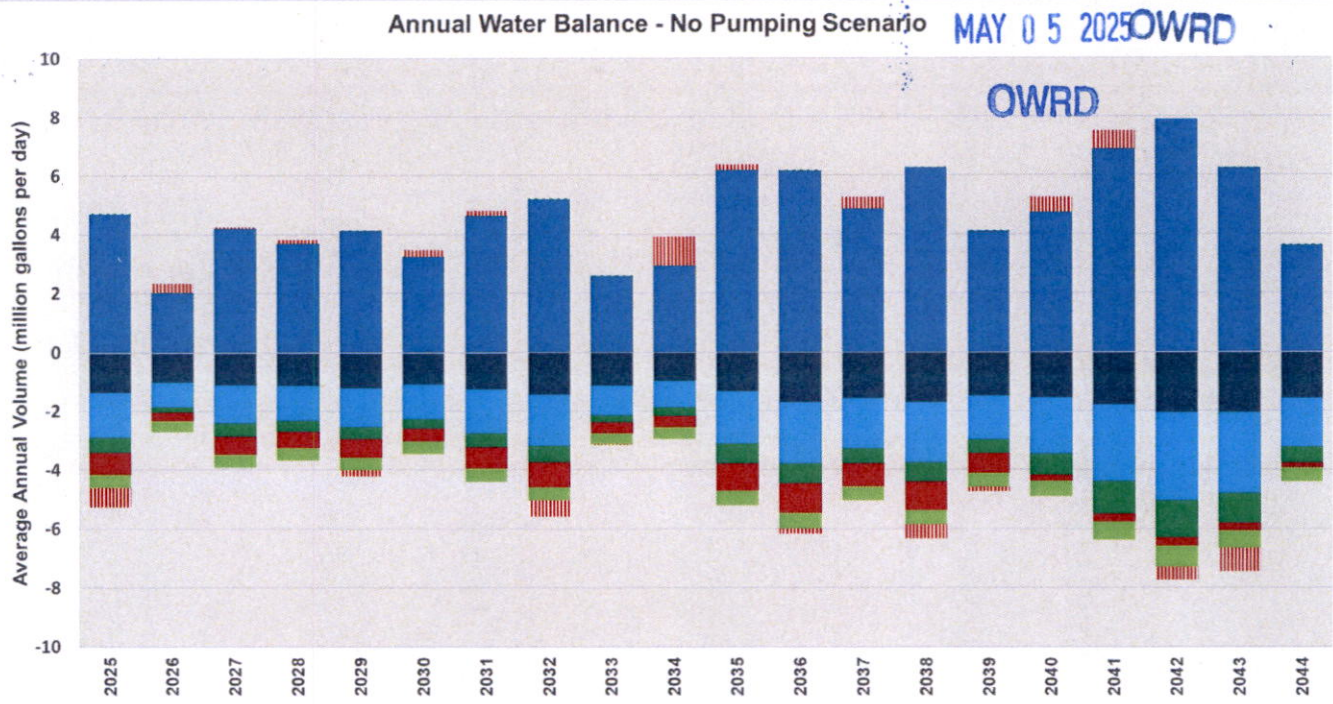
Received
MAY 05 2025
OWRD

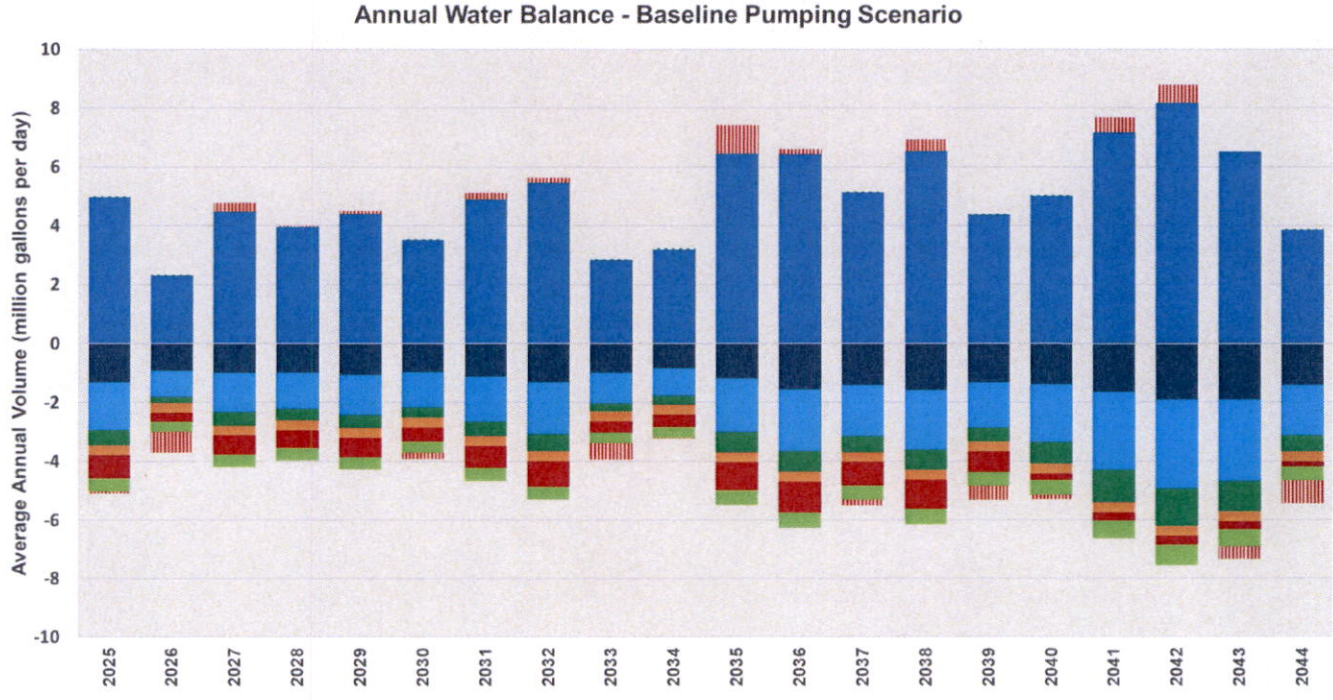
March 2025

TODD GROUNDWATER

Figure 31
Water Levels and TDS Concentrations in Landward Monitoring Wells

Received
APR 24 2025
OWRD





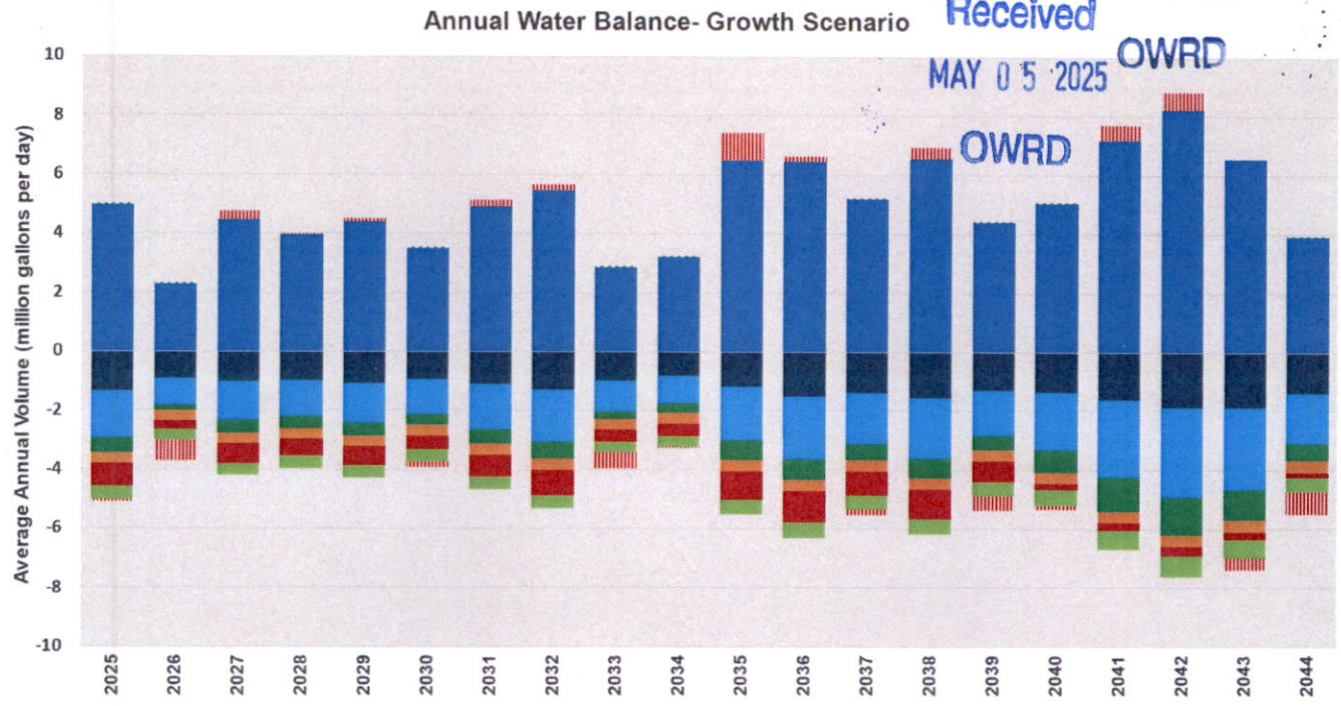
Legend

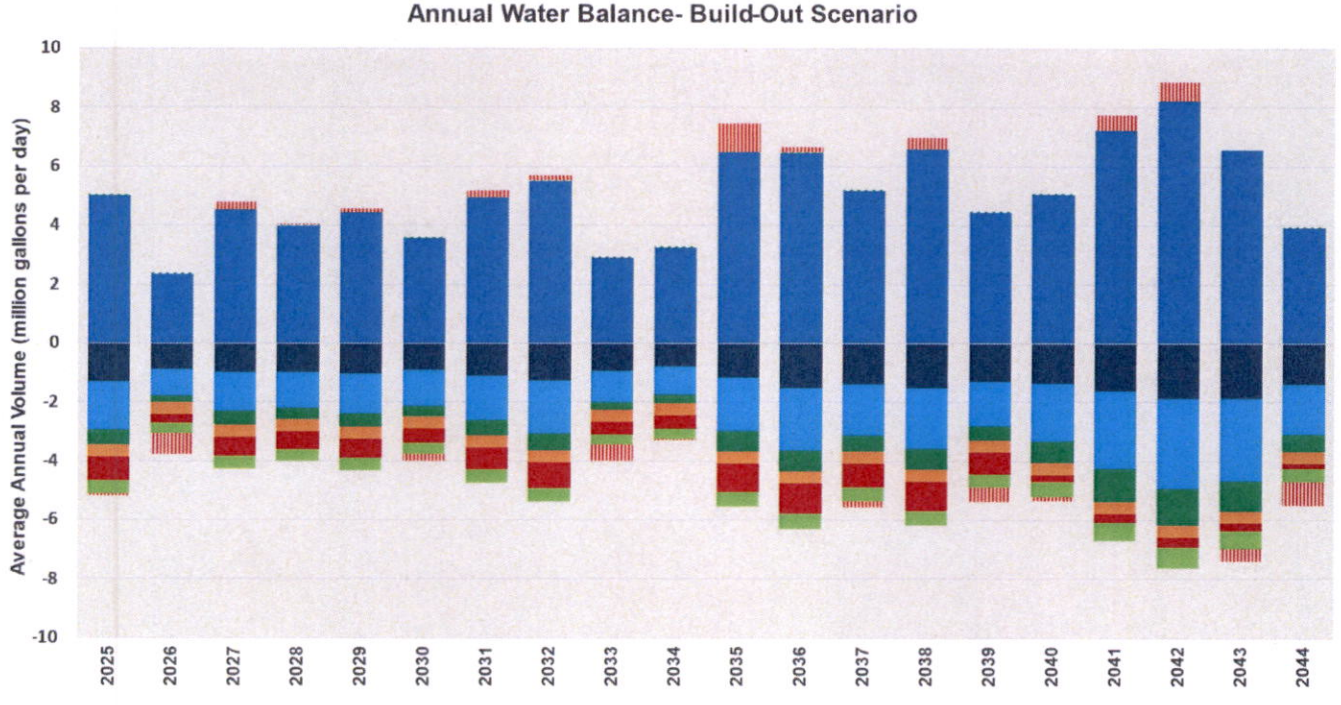
- Annual Storage Change
- ET
- Surface Outflow
- Wells
- East Boundary Outflow
- Neocoxie Creek Outflow
- Ocean Outflow
- East Boundary Inflow
- Neocoxie Creek Inflow
- Ocean Inflow
- Surface Recharge

March 2025

TODD GROUNDWATER

Figure 32
Annual Water Budgets for No Pumping and Baseline Scenarios





Legend

- Annual Storage Change
- ET
- Surface Outflow
- Wells
- East Boundary Outflow
- Neocoxie Creek Outflow
- Ocean Outflow
- East Boundary Inflow
- Neocoxie Creek Inflow
- Ocean Inflow
- Surface Recharge

March 2025

TODD GROUNDWATER

Figure 33
Annual Water Budgets for Growth and Build-Out Scenarios

KNOW ALL MEN BY THESE PRESENTS: That

WHEREAS, on the 11th day of June, 1947, an order was made by the County Court of Clatsop County, Oregon, sitting for the transaction of county business, authorizing this conveyance, which said order was entered at Page 2 of Vol. "30" of the proceedings of the County Court of Clatsop County, Oregon.

NOW, THEREFORE, KNOW ALL MEN BY THESE PRESENTS, That CLATSOP COUNTY, OREGON, in consideration of the sum of One and No/100 ($1.00) Dollars to it paid by the CITY OF GEARHART, a municipal corporation of the State of Oregon, does hereby remise, release and forever quitclaim unto the said CITY OF GEARHART, a municipal corporation, all its right, title and interest in and to the following described real property, situated in the ~~County of Clatsop,~~ State of Oregon, to-wit:

Parcel No. 1:

Block Five (5), save and except the South Twenty (20) feet of Block Five (5), KRUSE'S ~~FIRST~~ ADDITION TO GEARHART ~~PARK~~, City of Gearhart, County of Clatsop, State of Oregon.

Parcel No. 2:

Block Fifteen (15), save and except the South Twenty (20) feet of Block Fifteen (15), OCEANSIDE ADDITION TO GEARHART PARK, City of Gearhart, County of Clatsop, State of Oregon.

Parcel No. 3:

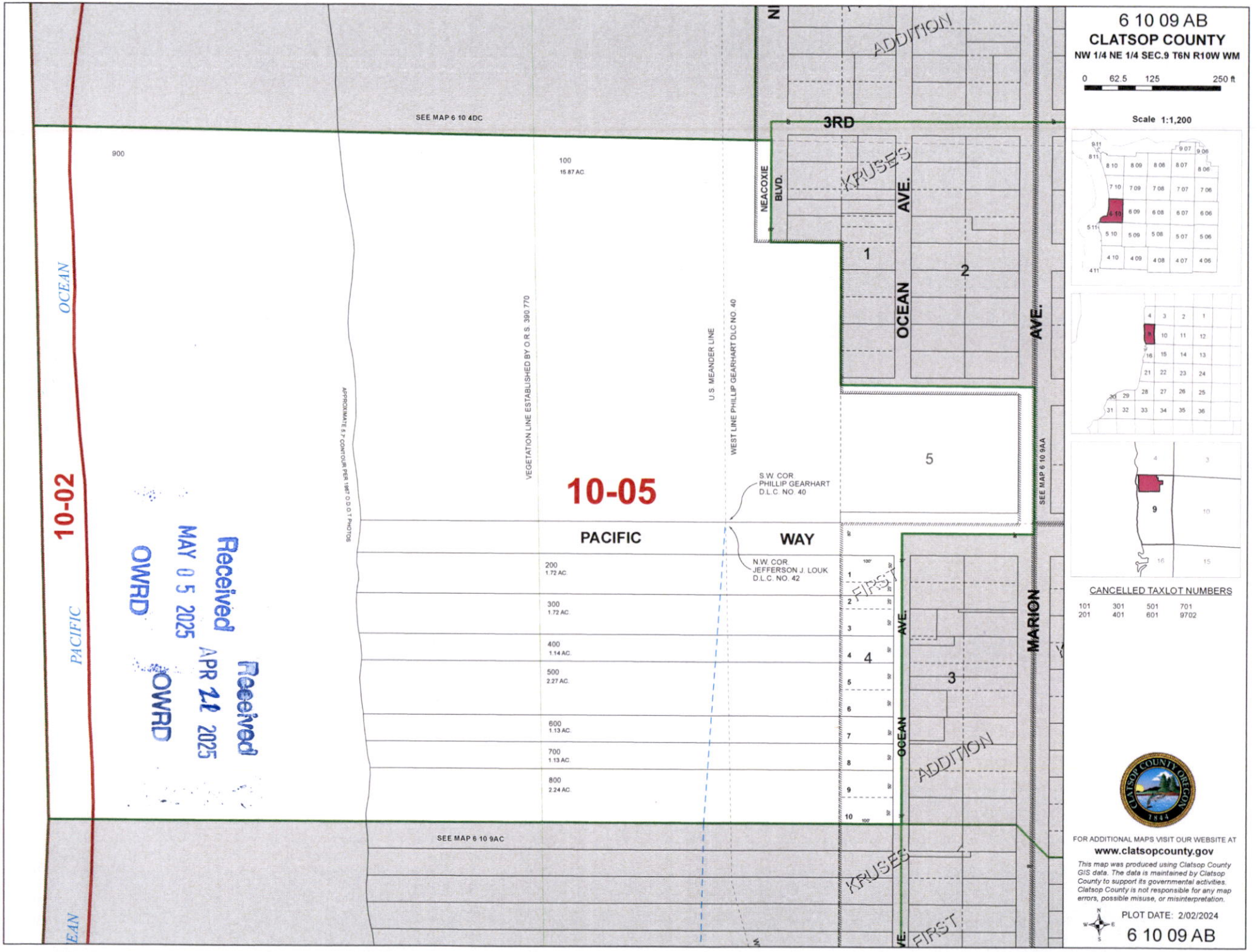
Beginning at the Southwest corner of Lot Twenty (20), Block One (1), KRUSE'S FIRST ADDITION TO GEARHART PARK; thence North along the West line of Lots Twenty (20), Nineteen (19) and Eighteen (18), Block One (1), KRUSE'S FIRST ADDITION TO GEARHART PARK, a distance of 150 feet to the Southwest corner of Lot Seventeen (17) in said Block One (1); thence West on the Westerly extension of the South line of said Lot Seventeen (17), a distance of 100 feet; thence South on a line parallel with the West line of said Lots 18, 19 and 20, Block One (1), KRUSE'S FIRST ADDITION TO GEARHART PARK, a distance of 150 feet to a point West of the point of beginning; thence East a distance of 100 feet to the point of beginning, in the City of Gearhart, County of Clatsop, State of Oregon.

This conveyance is made with the express provision that the foregoing described real property and every part thereof shall be

KNOW ALL MEN BY THESE PRESENTS, That we, Robert B. Taylor and Ione J. Taylor, husband and wife, in consideration of THREE THOUSAND AND NO/100 Dollars, to us paid by City of Gearhart, a municipal corporation, do hereby grant, bargain, sell and convey unto said City of Gearhart, a municipal corporation, its successors and assigns, all the following real property, with the tenements, hereditaments and appurtenances situated in the City of Gearhart County of Clatsop and State of Oregon, bounded and described as follows, to-wit:

PARCEL NO. 1: Beginning at the southwest corner of Block 5, KRUSE'S FIRST ADDITION TO GEARHART PARK;
thence west along the south line of said Block 5 extended to ordinary high water mark in the Pacific Ocean;
thence Northerly along the line of ordinary high water in the Pacific Ocean to a point where said high water mark is intersected by the westerly extension of the south line of Lot 2, Block 3, OCEANSIDE ADDITION TO GEARHART PARK;
thence East along the westerly extension of the south line of said Lot 2, Block 3, OCEANSIDE ADDITION TO GEARHART PARK to the point where said south line extended westerly intersects the west line of Neacoxie Boulevard in OCEANSIDE ADDITION TO GEARHART PARK;
thence South along the west boundary of Neacoxie Boulevard to a point West of the southwest corner of Lot 26, Block 1, KRUSE'S FIRST ADDITION TO GEARHART PARK;
thence East along the westerly extension of the south line of said Lot 26 and along the south line of said lot a distance of 160 feet, more or less, to the northwest corner of Lot 16, Block 1, KRUSE'S FIRST ADDITION TO GEARHART PARK;
thence South along the west line of Lots 16 and 17 in said Block 1 a distance of 100 feet, more or less, to the southwest corner of said Lot 17;
thence west along the westerly extension of the south line of said Lot 17, a distance of 100 feet;
thence South 150 feet to an intersection with the westerly extension of the south line of Lot 20, Block 1, KRUSE'S FIRST ADDITION TO GEARHART PARK;
thence East along the westerly extension of the south line of said Lot 20, Block 1, KRUSE'S FIRST ADDITION TO GEARHART PARK, a distance of 100 feet to the southwest corner of said Lot 20;
thence South along the northerly extension of the west boundary line of Block 5, KRUSE'S FIRST ADDITION TO GEARHART PARK, and the West boundary line of said block to the point of beginning, in the City of Gearhart, County of Clatsop, State of Oregon;

PARCEL NO. 2: That portion of Lots 2 and 3, and that portion of the J. J. Louk Donation Land Claim, all in Section 9, Township 6 North, Range 10 West, Willamette Meridian, described as follows:
Beginning at a point where the south line of Lot 4, Block 1, SECOND ADDITION TO GEARHART PARK intersects the northerly extension of the westerly line of Neacoxie Boulevard in Redondo Addition to Gearhart Park, as evidenced by the plat thereof appearing in Plat Book 5, page 14, Records of Clatsop County, Oregon;


6 10 09 AB
CLATSOP COUNTY
NW 1/4 NE 1/4 SEC.9 T6N R10W WM
0 62.5 125 250 ft
Scale 1:1,200
SEE MAP 6 10 4DC
900
100
15.87 AC.
3RD
KRUSES
AVE.
NEACOXIE
BLVD.
ADDITION
OCEAN
AVE.
1
2
5
SEE MAP 6 10 9AA
OCEAN
PACIFIC
10-02
VEGETATION LINE ESTABLISHED BY O.R.S. 390.770
APPROXIMATE 67 CONTOUR PER 1967 O.D.O.T. PHOTOS
U.S. MEANDER LINE
WEST LINE PHILLIP GEARHART DLC NO. 40
10-05
S.W. COR.
PHILLIP GEARHART
D.L.C. NO. 40
PACIFIC
WAY
N.W. COR.
JEFFERSON J. LOUK
D.L.C. NO. 42
200
1.72 AC.
300
1.72 AC.
400
1.14 AC.
500
2.27 AC.
600
1.13 AC.
700
1.13 AC.
800
2.24 AC.
FIRST
AVE.
4
3
MARION
OCEAN
ADDITION
SEE MAP 6 10 9AC
KRUSES
FIRST
Received
MAY 05 2025
OWRD
Received
APR 11 2025
OWRD
CANCELLED TAXLOT NUMBERS
101 301 501 701
201 401 601 9702
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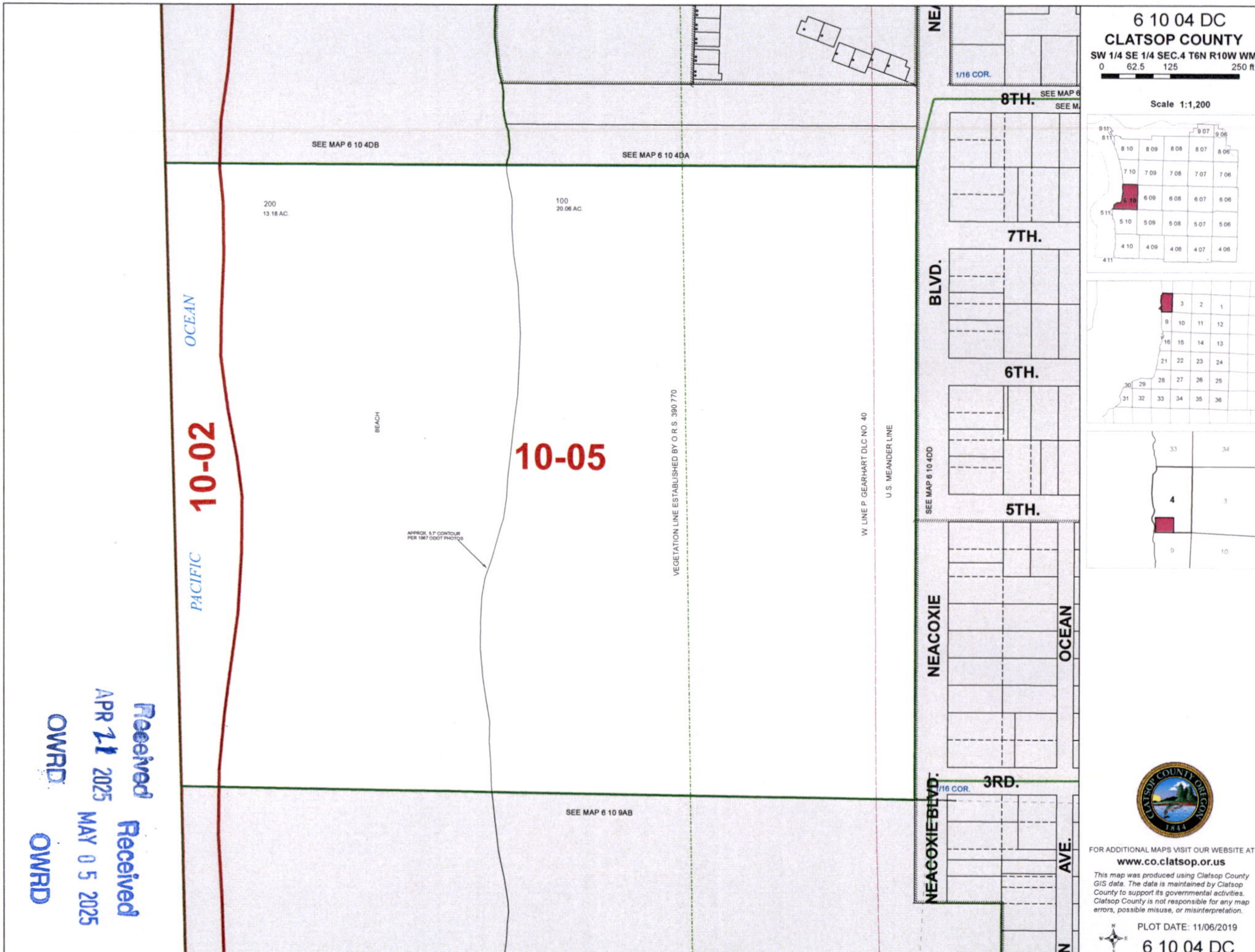
www.clatsopcounty.gov
This map was produced using Clatsop County GIS data. The data is maintained by Clatsop County to support its governmental activities. Clatsop County is not responsible for any map errors, possible misuse, or misinterpretation.
PLOT DATE: 2/02/2024
6 10 09 AB


6 10 04 DC
CLATSOP COUNTY
SW 1/4 SE 1/4 SEC.4 T6N R10W WM
0 62.5 125 250 ft
Scale 1:1,200
SEE MAP 6 10 4DB
SEE MAP 6 10 4DA
SEE MAP 6 10 4DD
SEE MAP 6 10 9AB
200
13.18 AC
100
20.06 AC
PACIFIC OCEAN
10-02
10-05
BEACH
APPROX. 5.7' CONTOUR PER 1967 ODOT PHOTOS
VEGETATION LINE ESTABLISHED BY O.R.S. 390.770
W. LINE P. GEARHART DLC NO. 40
U.S. MEANDER LINE
1/16 COR.
8TH.
7TH.
6TH.
5TH.
3RD.
NEACOXIE BLVD.
OCEAN AVE.
FOR ADDITIONAL MAPS VISIT OUR WEBSITE AT
www.co.clatsop.or.us
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PLOT DATE: 11/06/2019
6 10 04 DC
Received
APR 21 2025
OWRD
Received
MAY 0 5 2025
OWRD

CLAT 53264

CLAT 53264

10-22-2009

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

WELL LABEL # L 59017

START CARD # 1007878

(1) LAND OWNER

Owner Well I.D. PW #1

First Name _____ Last Name _____

Company City of Gearhart

Address 698 Pacific Way

City Gearhart State OR Zip 97138

(2) TYPE OF WORK

☒ New Well ☐ Deepening ☐ Conversion
☐ Alteration (repair/recondition) ☐ Abandonment

(3) DRILL METHOD

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

(4) PROPOSED USE

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

(5) BORE HOLE CONSTRUCTION

Special Standard ☐ Attach copy

Depth of Completed Well 119.00 ft.

BORE HOLE Dia	From	To	SEAL Material	From	To	Amt	sacks/ lbs
16	0	119	Cement	0	76	68	S

How was seal placed: Method ☐ A ☐ B ☒ C ☐ D ☐ E

☐ Other _____

Backfill placed from _____ ft. to _____ ft. Material _____

Filter pack from 76 ft. to 119 ft. Material Silica Sand Size 10/20

Explosives used: ☐ Yes Type _____ Amount _____

(6) CASING/LINER

Casing	Liner	Dia	+	From	To	Gauge	Stl	Plstc	Wld	Thrd
●	○	10	☒	3	87	0.375	●	○	☒	☐
●	○	10	☐	114	119	0.375	●	○	☒	☐
○	○		☐				○	○	☐	☐
○	○		☐				○	○	☐	☐
○	○		☐				○	○	☐	☐

Shoe ☐ Inside ☐ Outside ☐ Other Location of shoe(s) _____

Temp casing ☐ Yes Dia _____ From _____ To _____

(7) PERFORATIONS/SCREENS

Perforations Method _____

Screens Type Spiral Wrap Material 304 SS

Perf/Screen	Casing/ Liner	Screen Dia	From	To	Scrn/slot width	Slot length	# of slots	Tele/ pipe size
Screen		10	84	114	.035			

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

● Pump ○ Bailer ○ Air ○ Flowing Artesian

Yield gal/min	Drawdown	Drill stem/Pump depth	Duration (hr)
125	41	84	24

Temperature 54 °F Lab analysis ☒ Yes By Consultant

Water quality concerns? ☐ Yes (describe below)

From	To	Description	Amount	Units

(9) LOCATION OF WELL (legal description)

County Clatsop Twp 6.00 N N/S Range 10.00 W E/W WM

Sec 4 SW 1/4 of the SE 1/4 Tax Lot 100

Tax Map Number _____ Lot _____

Lat ° 0 ' " or _____ DMS or DD

Long ° 0 ' " or _____ DMS or DD

○ Street address of well ● Nearest address

6th Ave and Marion Street, Gearhart, Oregon

(10) STATIC WATER LEVEL

	Date	SWL(psi)	+	SWL(ft)
Existing Well / Predeepening				
Completed Well	09-10-2009			27

Flowing Artesian? ☐ Dry Hole? ☐

WATER BEARING ZONES Depth water was first found 8'

SWL Date	From	To	Est Flow	SWL(psi)	+	SWL(ft)
08-27-2009	20	119	125			25

(11) WELL LOG

Ground Elevation _____

Material	From	To
Med/Coarse/Fine Sands	0	65
Med/Coarse/Fine Sands with sea shells	65	75
Med/Coarse/Fine Sands, dark wood with trace org.	75	115
Dark gray sand with clay, dense	115	118
Hard, fractured basalt	118	119

RECEIVED
MAR 2 5 2010
WATER RESOURCES DEPT
SALEM, OREGON

Received
APR 11 2025
OWRD

Received
MAY 05 2025
OWRD

Date Started 08-27-2009 Completed 10-21-2009

(unbonded) Water Well Constructor Certification

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

License Number 1702 Date 10-22-2009

Electronically Filed

Signed RUSTY R OTTO (E-filed)

(bonded) Water Well Constructor Certification

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

License Number 1523 Date 10-22-2009

Electronically Filed

Signed ROBERT STADELI (E-filed)

Contact Info (optional) _____

ORIGINAL - WATER RESOURCES DEPARTMENT

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

Form Version: 0.95

CLAT 53265

CLAT 53265

10-22-2009

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

WELL LABEL # L 59019

START CARD # 1007879

(1) LAND OWNER

Owner Well I.D. PW #3

First Name _____ Last Name _____

Company City of Gearhart

Address 698 Pacific Way

City Gearhart State OR Zip 97138

(2) TYPE OF WORK

☒ New Well ☐ Deepening ☐ Conversion
☐ Alteration (repair/recondition) ☐ Abandonment

(3) DRILL METHOD

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

(4) PROPOSED USE

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

(5) BORE HOLE CONSTRUCTION

Special Standard ☐ (Attach copy)

Depth of Completed Well 119.00 ft.

BORE HOLE Dia	From	To	SEAL Material	From	To	Amt	sacks/ lbs
16	0	150	Cement	0	78	71	S

How was seal placed: Method ☐ A ☐ B ☒ C ☐ D ☐ E

☐ Other _____

Backfill placed from 119 ft. to 150 ft. Material Neat cement

Filter pack from 78 ft. to 119 ft. Material Silica Sand Size 10/20

Explosives used: ☐ Yes Type _____ Amount _____

(6) CASING/LINER

Casing	Liner	Dia	+	From	To	Gauge	Stl	Plstc	Wld	Thrd
◉	○	10	☒	2	84	0.375	◉	○	☒	☐
◉	○	10	☐	114	119	0.375	◉	○	☒	☐
○	○		☐				○	○	☐	☐
○	○		☐				○	○	☐	☐
○	○		☐				○	○	☐	☐

Shoe ☐ Inside ☐ Outside ☐ Other Location of shoe(s) _____

Temp casing ☐ Yes Dia _____ From _____ To _____

(7) PERFORATIONS/SCREENS

Perforations Method _____

Screens Type Spiral Wrap Material 304 SS

Perf/Screen	Casing/ Liner	Screen Dia	From	To	Scrn/slot width	Slot length	# of slots	Tele/ pipe size
Screen		10	84	114	.02			

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

◉ Pump ○ Bailer ○ Air ○ Flowing Artesian

Yield gal/min	Drawdown	Drill stem/Pump depth	Duration (hr)
100	42.2	82	24

Temperature 52 °F Lab analysis ☒ Yes By Consultant

Water quality concerns? ☐ Yes (describe below)

From	To	Description	Amount	Units

(9) LOCATION OF WELL (legal description)

County Clatsop Twp 6.00 N N/S Range 10.00 W E/W WM

Sec 4 SW 1/4 of the SE 1/4 Tax Lot 100

Tax Map Number _____ Lot _____

Lat ° 0 ' " or _____ DMS or DD

Long ° 0 ' " or _____ DMS or DD

○ Street address of well ◉ Nearest address

6th Ave and Marion Street, Gearhart, Oregon

(10) STATIC WATER LEVEL

	Date	SWL(psi)	+	SWL(ft)
Existing Well / Predeepening				
Completed Well	10-02-2009			25

Flowing Artesian? ☐ Dry Hole? ☐

WATER BEARING ZONES Depth water was first found 10'

SWL Date	From	To	Est Flow	SWL(psi)	+	SWL(ft)
09-22-2009	19	150	100			25

(11) WELL LOG

Ground Elevation _____

Material	From	To
Fine/Med Sand - Dark	0	55
Fine/Med Sand - Gray, occassional sea shells	55	70
Fine/Med Sand - Orange	70	120
Fine/Med Sand - Gray w/ gravels	120	150

Received
APR 22 2025
Received
OWRD
MAY 05 2025
OWRD

RECEIVED
MAR 25 2010
WATER RESOURCES DEPT
SALEM, OREGON

Date Started 09-13-2009 Completed 10-21-2009

(unbonded) Water Well Constructor Certification

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

License Number 1702 Date 10-22-2009

Electronically Filed

Signed RUSTY R OTTO (E-filed)

(bonded) Water Well Constructor Certification

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

License Number 1523 Date 10-22-2009

Electronically Filed

Signed ROBERT STADELI (E-filed)

Contact Info (optional) _____

ORIGINAL - WATER RESOURCES DEPARTMENT

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

Form Version: 0.95

CLAT 53266

CLAT 53266

10-22-2009

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

WELL LABEL # L 59021

START CARD # 1007880

(1) LAND OWNER

Owner Well I.D. PW # 5

First Name _____ Last Name _____

Company City of Gearhart

Address 698 Pacific Way

City Gearhart State OR Zip 97138

(2) TYPE OF WORK

☒ New Well ☐ Deepening ☐ Conversion ☐ Alteration (repair/recondition) ☐ Abandonment

(3) DRILL METHOD

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

(4) PROPOSED USE

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

(5) BORE HOLE CONSTRUCTION

Special Standard ☐ Attach copy

Depth of Completed Well 117.00 ft.

BORE HOLE Dia	From	To	SEAL Material	From	To	Amt	sacks/ lbs
16	0	117	Cement	0	75	64	S

How was seal placed: Method ☐ A ☐ B ☒ C ☐ D ☐ E

☐ Other _____

Backfill placed from _____ ft. to _____ ft. Material _____

Filter pack from 75 ft. to 117 ft. Material Silica Sand Size 10/20

Explosives used: ☐ Yes Type _____ Amount _____

(6) CASING/LINER

Casing	Liner	Dia	+	From	To	Gauge	Stl	Plstc	Wld	Thrd
●	○	10	☒	2	81	0.375	●	○	☒	☐
●	○	10	☐	112	117	0.375	●	○	☒	☐
○	○		☐				○	○	☐	☐
○	○		☐				○	○	☐	☐
○	○		☐				○	○	☐	☐

Shoe ☐ Inside ☐ Outside ☐ Other Location of shoe(s) _____

Temp casing ☐ Yes Dia _____ From _____ To _____

(7) PERFORATIONS/SCREENS

Perforations Method _____

Screens Type Spiral Wrap Material 304 SS

Perf/Screen	Casing/ Liner	Screen Dia	From	To	Scrn/slot width	Slot length	# of slots	Tele/ pipe size
Screen		10	81	112	.035			

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

● Pump ○ Bailer ○ Air ○ Flowing Artesian

Yield gal/min	Drawdown	Drill stem/Pump depth	Duration (hr)
200	69.7	75	24

Temperature 52 °F Lab analysis ☒ Yes By Consultant

Water quality concerns? ☐ Yes (describe below)

From	To	Description	Amount	Units

(9) LOCATION OF WELL (legal description)

County Clatsop Twp 6.00 N N/S Range 10.00 W E/W WM

Sec 4 SW 1/4 of the SE 1/4 Tax Lot 100

Tax Map Number _____ Lot _____

Lat ° 0 ' " or _____ DMS or DD

Long ° 0 ' " or _____ DMS or DD

○ Street address of well ● Nearest address

6th Ave and Marion Street, Gearhart, Oregon

(10) STATIC WATER LEVEL

	Date	SWL(psi)	+	SWL(ft)
Existing Well / Predeepening				
Completed Well	10-13-2009			26.5

Flowing Artesian? ☐ Dry Hole? ☐

WATER BEARING ZONES Depth water was first found 9'

SWL Date	From	To	Est Flow	SWL(psi)	+	SWL(ft)
10-09-2009	20	117	200			26

(11) WELL LOG

Ground Elevation _____

Material	From	To
Fine/Med Sand - brown	0	55
Fine/Med Sand - Gray with seashells, some gravel	55	80
Fine Sand with gravel	80	100
Gravels - Brown Sand	100	116
Fractured Bedrock	116	117

Received Received RECEIVED
MAY 05 2025 APR 11 2025 MAR 25 2010
OWRD OWRD WATER RESOURCES DEPT SALEM, OREGON

Date Started 10-08-2009 Completed 10-21-2009

(unbonded) Water Well Constructor Certification

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

License Number 1702 Date 10-22-2009

Electronically Filed

Signed RUSTY R OTTO (E-filed)

(bonded) Water Well Constructor Certification

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

License Number 1523 Date 10-22-2009

Electronically Filed

Signed ROBERT STADELI (E-filed)

Contact Info (optional) _____

ORIGINAL - WATER RESOURCES DEPARTMENT

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

Form Version: 0.95

CLAT 53267

CLAT 53267

10-22-2009

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

WELL LABEL # L 59023

START CARD # 1007875

(1) LAND OWNER

Owner Well I.D. PW #7

First Name _____ Last Name _____

Company City of Gearhart

Address 698 Pacific Way

City Gearhart State OR Zip 97138

(2) TYPE OF WORK

☒ New Well ☐ Deepening ☐ Conversion
☐ Alteration (repair/recondition) ☐ Abandonment

(3) DRILL METHOD

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

(4) PROPOSED USE

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

(5) BORE HOLE CONSTRUCTION

Special Standard ☐ Attach copy

Depth of Completed Well 131.00 ft.

BORE HOLE Dia	From	To	SEAL Material	From	To	Amt	sacks/ lbs
10	0	131	Cement	0	90	91	S

How was seal placed: Method ☐ A ☐ B ☒ C ☐ D ☐ E

☐ Other _____

Backfill placed from _____ ft. to _____ ft. Material _____

Filter pack from 90 ft. to 125.7 ft. Material Silica Sand Size 10/20

Explosives used: ☐ Yes Type _____ Amount _____

(6) CASING/LINER

Casing	Liner	Dia	+	From	To	Gauge	Stl	Plstc	Wld	Thrd
◉	○	10	☒	2.5	95	0.375	◉	○	☒	☐
◉	○	10	☐	125	131	0.375	◉	○	☒	☐
○	○		☐				○	○	☐	☐
○	○		☐				○	○	☐	☐
○	○		☐				○	○	☐	☐

Shoe ☐ Inside ☐ Outside ☐ Other Location of shoe(s) _____

Temp casing ☐ Yes Dia _____ From _____ To _____

(7) PERFORATIONS/SCREENS

Perforations Method _____

Screens Type Spiral Wrap Material 304 SS

Perf/Screen	Casing/ Liner	Screen Dia	From	To	Scrn/slot width	Slot length	# of slots	Tele/ pipe size
Screen		10	95	125	.02			

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

◉ Pump ○ Bailer ○ Air ○ Flowing Artesian

Yield gal/min	Drawdown	Drill stem/Pump depth	Duration (hr)
200	74.5	89	24

Temperature 54 °F Lab analysis ☒ Yes By Consultant

Water quality concerns? ☐ Yes (describe below)

From	To	Description	Amount	Units

(9) LOCATION OF WELL (legal description)

County Clatsop Twp 6.00 N N/S Range 10.00 W E/W WM

Sec 4 SW 1/4 of the SE 1/4 Tax Lot 100

Tax Map Number _____ Lot _____

Lat ° 0 ' " or _____ DMS or DD

Long ° 0 ' " or _____ DMS or DD

○ Street address of well ◉ Nearest address

6th Ave and Marion Street, Gearhart, Oregon

(10) STATIC WATER LEVEL

	Date	SWL(psi)	+	SWL(ft)
Existing Well / Predeepening				
Completed Well	09-18-2009			21.8

Flowing Artesian? ☐ Dry Hole? ☐

WATER BEARING ZONES Depth water was first found 12'

SWL Date	From	To	Est Flow	SWL(psi)	+	SWL(ft)
09-12-2009	20	130	200			20

(11) WELL LOG

Ground Elevation _____

Material	From	To
Medium - Dark Brown Sand	0	60
Medium - Gray sand with sea shells	60	118
Hard - Black basalt w/ cobbles	118	119
Medium, dense / Fine sands, wet	119	130
Hard - Black basalt	130	131

Received APR 14 2025 OWRD

Received MAY 05 2025 OWRD

RECEIVED MAR 25 2010 WATER RESOURCES DEPT SALEM, OREGON

Date Started 08-30-2009 Completed 10-22-2009

(unbonded) Water Well Constructor Certification

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

License Number 1702 Date 10-22-2009

Electronically Filed

Signed RUSTY R OTTO (E-filed)

(bonded) Water Well Constructor Certification

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

License Number 1523 Date 10-22-2009

Electronically Filed

Signed ROBERT STADELI (E-filed)

Contact Info (optional) _____

ORIGINAL - WATER RESOURCES DEPARTMENT

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

Form Version: 0.95

~~CLAT 53268~~

CLAT 53268

10-22-2009

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

WELL LABEL # L 59025

START CARD # 1007881

(1) LAND OWNER

Owner Well I.D. PW #9

First Name _____ Last Name _____

Company City of Gearhart

Address 698 Pacific Way

City Gearhart State OR Zip 97138

(2) TYPE OF WORK

☒ New Well ☐ Deepening ☐ Conversion
☐ Alteration (repair/recondition) ☐ Abandonment

(3) DRILL METHOD

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

(4) PROPOSED USE

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

(5) BORE HOLE CONSTRUCTION

Special Standard ☐ (Attach copy)

Depth of Completed Well 123.00 ft.

BORE HOLE Dia	From	To	SEAL Material	From	To	Amt	sacks/ lbs
16	0	123	Cement	0	54	70	S

How was seal placed: Method ☐ A ☐ B ☒ C ☐ D ☐ E

☐ Other

Backfill placed from ft. to ft. Material

Filter pack from 83.5 ft. to 123 ft. Material Silica Sand Size 10/20

Explosives used: ☐ Yes Type Amount

(6) CASING/LINER

Casing	Liner	Dia	+	From	To	Gauge	Stl	Plstc	Wld	Thrd
●		10	☒	2	88	0.375	●		☒	
●		10	☐	118	123	0.375	●		☒	
			☐							
			☐							
			☐							

Shoe ☐ Inside ☐ Outside ☐ Other Location of shoe(s)

Temp casing ☐ Yes Dia From To

(7) PERFORATIONS/SCREENS

Perforations Method

Screens Type Spiral Wrap Material 304 SS

Perf/Screen	Casing/ Liner	Screen Dia	From	To	Scrn/slot width	Slot length	# of slots	Tele/ pipe size
Screen		10	88	118	.035			

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

● Pump ○ Bailer ○ Air ○ Flowing Artesian

Yield gal/min	Drawdown	Drill stem/Pump depth	Duration (hr)
255	71.9	86	24

Temperature 53 °F Lab analysis ☒ Yes By Consultant

Water quality concerns? ☐ Yes (describe below)

From	To	Description	Amount	Units

(9) LOCATION OF WELL (legal description)

County Clatsop Twp 6.00 N N/S Range 10.00 W E/W WM

Sec 4 SW 1/4 of the SE 1/4 Tax Lot 100

Tax Map Number Lot

Lat ° 0 ' " or DMS or DD

Long ° 0 ' " or DMS or DD

○ Street address of well ● Nearest address

6th Ave and Marion Street, Gearhart, Oregon

(10) STATIC WATER LEVEL

	Date	SWL(psi)	+	SWL(ft)
Existing Well / Predeepening				
Completed Well	10-12-2009			21

Flowing Artesian? ☐ Dry Hole? ☐

WATER BEARING ZONES Depth water was first found 12'

SWL Date	From	To	Est Flow	SWL(psi)	+	SWL(ft)
09-22-2009	18	123	255			25

(11) WELL LOG

Ground Elevation

Material	From	To
Sand - Fine to medium	0	116
Gravlly sand	116	123
Basalt - Hard	123	123

Received MAY 05 2025 OWRD

Received APR 29 2025 OWRD

RECEIVED MAR 25 2010 WATER RESOURCES DEPT SALEM, OREGON

Date Started 09-21-2009 Completed 10-21-2009

(unbonded) Water Well Constructor Certification

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

License Number 1702 Date 10-22-2009

Electronically Filed

Signed RUSTY R OTTO (E-filed)

(bonded) Water Well Constructor Certification

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

License Number 1523 Date 10-22-2009

Electronically Filed

Signed ROBERT STADELI (E-filed)

Contact Info (optional)

ORIGINAL - WATER RESOURCES DEPARTMENT

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

Form Version: 0.95

CLAT 53269

CLAT 53269

10-22-2009

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

WELL LABEL # L 59027

START CARD # 1007876

(1) LAND OWNER

Owner Well I.D. PW #11

First Name _____ Last Name _____

Company City of Gearhart

Address 698 Pacific Way

City Gearhart State OR Zip 97138

(2) TYPE OF WORK

☒ New Well ☐ Deepening ☐ Conversion
☐ Alteration (repair/recondition) ☐ Abandonment

(3) DRILL METHOD

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

(4) PROPOSED USE

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

(5) BORE HOLE CONSTRUCTION

Special Standard ☐ (Attach copy)

Depth of Completed Well 125.00 ft.

BORE HOLE Dia	From	To	SEAL Material	From	To	Amt	sacks/ lbs
10	0	125	Cement	0	85	76	S

How was seal placed: Method ☐ A ☐ B ☒ C ☐ D ☐ E

☐ Other _____

Backfill placed from _____ ft. to _____ ft. Material _____

Filter pack from 85.7 ft. to 125 ft. Material Silica Sand Size 10/20

Explosives used: ☐ Yes Type _____ Amount _____

(6) CASING/LINER

Casing	Liner	Dia	+	From	To	Gauge	Stl	Plstc	Wld	Thrd
●	○	10	☒	2	90	0.375	●	○	☒	☐
●	○	10	☐	121	125	0.375	●	○	☒	☐
○	○		☐				○	○	☐	☐
○	○		☐				○	○	☐	☐
○	○		☐				○	○	☐	☐

Shoe ☐ Inside ☐ Outside ☐ Other Location of shoe(s) _____

Temp casing ☐ Yes Dia _____ From _____ To _____

(7) PERFORATIONS/SCREENS

Perforations Method _____

Screens Type Spiral Wrap Material 304 SS

Perf/Screen	Casing/ Liner	Screen Dia	From	To	Scrn/slot width	Slot length	# of slots	Tele/ pipe size
Screen		10	90	121	.035			

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

● Pump ○ Bailer ○ Air ○ Flowing Artesian

Yield gal/min	Drawdown	Drill stem/Pump depth	Duration (hr)
200	74	84	72

Temperature 53 °F Lab analysis ☐ Yes By _____

Water quality concerns? ☐ Yes (describe below)

From	To	Description	Amount	Units

(9) LOCATION OF WELL (legal description)

County Clatsop Twp 6.00 N N/S Range 10.00 W E/W WM

Sec 4 SW 1/4 of the SE 1/4 Tax Lot 100

Tax Map Number _____ Lot _____

Lat ° 0 ' " or _____ DMS or DD

Long ° 0 ' " or _____ DMS or DD

○ Street address of well ● Nearest address

6th Ave and Marion Street, Gearhart, Oregon

(10) STATIC WATER LEVEL

	Date	SWL(psi)	+	SWL(ft)
Existing Well / Predeepening			☐	
Completed Well	09-30-2009		☐	25

Flowing Artesian? ☐ Dry Hole? ☐

WATER BEARING ZONES Depth water was first found 9'

SWL Date	From	To	Est Flow	SWL(psi)	+	SWL(ft)
09-27-2009	22	125	200		☐	25
					☐	
					☐	
					☐	
					☐	

(11) WELL LOG

Ground Elevation _____

Material	From	To
Medium / Fine Sand	0	120
Gravel / Cobbles	120	125
Basalt - Hard	125	125

Received
MAY 05 2025
OWRD

Received
APR 21 2025
OWRD

RECEIVED
MAR 25 2010
WATER RESOURCES DEPT
SALEM, OREGON

Date Started 09-19-2009 Completed 10-21-2009

(unbonded) Water Well Constructor Certification

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

License Number 1702 Date 10-22-2009

Electronically Filed

Signed RUSTY R OTTO (E-filed)

(bonded) Water Well Constructor Certification

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

License Number 1523 Date 10-22-2009

Electronically Filed

Signed ROBERT STADELI (E-filed)

Contact Info (optional) _____

ORIGINAL - WATER RESOURCES DEPARTMENT

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

Form Version: 0.95

CLAT 53270

CLAT 53270

10-22-2009

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

WELL LABEL # L 59029

START CARD # 1007873

(1) LAND OWNER

Owner Well I.D. PW #13

First Name _____ Last Name _____

Company City of Gearhart

Address 698 Pacific Way

City Gearhart State OR Zip 97138

(2) TYPE OF WORK

☒ New Well ☐ Deepening ☐ Conversion
☐ Alteration (repair/recondition) ☐ Abandonment

(3) DRILL METHOD

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

(4) PROPOSED USE

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

(5) BORE HOLE CONSTRUCTION

Special Standard ☐ (Attach copy)

Depth of Completed Well 157.00 ft.

BORE HOLE Dia	From	To	SEAL Material	From	To	Amt	sacks/ lbs
10	0	157	Cement	0	95	69	S

How was seal placed: Method ☐ A ☐ B ☒ C ☐ D ☐ E

☐ Other _____

Backfill placed from _____ ft. to _____ ft. Material _____

Filter pack from 95 ft. to 157 ft. Material Silica Sand Size 10/20

Explosives used: ☐ Yes Type _____ Amount _____

(6) CASING/LINER

Casing	Liner	Dia	+	From	To	Gauge	Stl	Plstc	Wld	Thrd
◉	○	10	☒	2.2	100.05	0.375	◉	○	☒	☐
○	○		☐				○	○	☐	☐
○	○		☐				○	○	☐	☐
○	○		☐				○	○	☐	☐
○	○		☐				○	○	☐	☐

Shoe ☐ Inside ☐ Outside ☐ Other Location of shoe(s) _____

Temp casing ☐ Yes Dia _____ From _____ To _____

(7) PERFORATIONS/SCREENS

Perforations Method _____

Screens Type Spiral Wrap Material 304 SS

Perf/Screen	Casing/ Liner	Screen Dia	From	To	Scrn/slot width	Slot length	# of slots	Tele/ pipe size
Screen		10	100.05	152	.035			

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

◉ Pump ○ Bailer ○ Air ○ Flowing Artesian

Yield gal/min	Drawdown	Drill stem/Pump depth	Duration (hr)
350	84.6	94	72

Temperature 54 °F Lab analysis ☒ Yes By Consultant

Water quality concerns? ☐ Yes (describe below)

From	To	Description	Amount	Units

(9) LOCATION OF WELL (legal description)

County Clatsop Twp 6.00 N N/S Range 10.00 W E/W WM

Sec 4 SW 1/4 of the SE 1/4 Tax Lot 100

Tax Map Number _____ Lot _____

Lat ° 0 ' " or _____ DMS or DD

Long ° 0 ' " or _____ DMS or DD

○ Street address of well ◉ Nearest address

6th Ave and Marion Street, Gearhart, Oregon

(10) STATIC WATER LEVEL

	Date	SWL(psi)	+	SWL(ft)
Existing Well / Predeepening				
Completed Well	10-07-2009			23

Flowing Artesian? ☐ Dry Hole? ☐

WATER BEARING ZONES Depth water was first found 15'

SWL Date	From	To	Est Flow	SWL(psi)	+	SWL(ft)
09-06-2009	118	156	175			25

(11) WELL LOG

Ground Elevation _____

Material	From	To
Medium / Coarse Fine Sands	0	54
Med / CoarseFine sands w/ sea shells	54	100
Med / Coarse Fine sands w/ gravels	100	118
Sand, gravel, cobbles	118	156
Black, very dense silty clay	156	157

Received
MAY 05 2025
OWRD

Received
APR 22 2025
OWRD

RECEIVED
MAR 25 2010
WATER RESOURCES DEPT
SALEM, OREGON

Date Started 09-04-2009 Completed 10-21-2009

(unbonded) Water Well Constructor Certification

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

License Number 1702 Date 10-22-2009

Electronically Filed

Signed RUSTY R OTTO (E-filed)

(bonded) Water Well Constructor Certification

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

License Number 1523 Date 10-22-2009

Electronically Filed

Signed ROBERT STADELI (E-filed)

Contact Info (optional) _____

ORIGINAL - WATER RESOURCES DEPARTMENT

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

Form Version: 0.95

CLAT 53271 AMENDED 10/26/09
CLAT 53271

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

10-22-2009

WELL LABEL # L 59030

START CARD # 1007877

(1) LAND OWNER

Owner Well I.D. PW #14

First Name _____ Last Name _____

Company City of Gearhart

Address 698 Pacific Way

City Gearhart State OR Zip 97138

(2) TYPE OF WORK

☒ New Well ☐ Deepening ☐ Conversion ☐ Alteration (repair/recondition) ☐ Abandonment

(3) DRILL METHOD

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

(4) PROPOSED USE

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

(5) BORE HOLE CONSTRUCTION

Special Standard ☐ Attach copy

Depth of Completed Well 159.00 ft.

BORE HOLE Dia	From	To	SEAL Material	From	To	Amt	sacks/ lbs
10	0	159	Cement	0	93.25	63	S

How was seal placed: Method ☐ A ☐ B ☒ C ☐ D ☐ E

☐ Other

Backfill placed from ____ ft. to ____ ft. Material ____

Filter pack from 93.25 ft. to 159 ft. Material Silica Sand Size 10/20

Explosives used: ☐ Yes Type ____ Amount ____

(6) CASING/LINER

Casing	Liner	Dia	+	From	To	Gauge	Stl	Plstc	Wld	Thrd
◉	○	10	☒	~~2.5~~ 2	~~102~~ 95	0.375	◉	○	☒	☐
◉	○	10	☐	~~125~~ 154	~~130.7~~ 159	0.375	◉	○	☒	☐
○	○		☐				○	○	☐	☐
○	○		☐				○	○	☐	☐
○	○		☐				○	○	☐	☐

Shoe ☐ Inside ☐ Outside ☐ Other Location of shoe(s) ____

Temp casing ☐ Yes Dia ____ From ____ To ____

(7) PERFORATIONS/SCREENS

Perforations Method ____

Screens Type Spiral Wrap Material 304 SS

Perf/Screen	Casing/ Liner	Screen Dia	From	To	Scrn/slot width	Slot length	# of slots	Tele/ pipe size
~~Screen~~		~~10~~	~~95~~	~~125~~	~~.02~~			
~~Scrn~~		10	102	154	0.035			

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

◉ Pump ○ Bailer ○ Air ○ Flowing Artesian

Yield gal/min	Drawdown	Drill stem/Pump depth	Duration (hr)
200	~~94.5~~ 81.8	~~89~~ 94	24

Temperature 53 °F Lab analysis ☒ Yes By Consultant

Water quality concerns? ☐ Yes (describe below)

From	To	Description	Amount	Units

(9) LOCATION OF WELL (legal description)

County Clatsop Twp 6.00 N N/S Range 10.00 W E/W WM

Sec 4 SW 1/4 of the SE 1/4 Tax Lot 100

Tax Map Number ____ Lot ____

Lat ____ ° ____ ' ____ " or ____ DMS or DD

Long ____ ° ____ ' ____ " or ____ DMS or DD

○ Street address of well ◉ Nearest address

6th Ave and Marion Street, Gearhart, Oregon

(10) STATIC WATER LEVEL

	Date	SWL(psi)	+	SWL(ft)
Existing Well / Predeepening				
Completed Well	09-18-2009			~~21.8~~ 23

Flowing Artesian? ☐ Dry Hole? ☐

WATER BEARING ZONES Depth water was first found ____

SWL Date	From	To	Est Flow	SWL(psi)	+	SWL(ft)
09-12-2009	20	131	200			~~20~~ 25

(11) WELL LOG

Ground Elevation ____

Material	From	To
Med / Coarse Fine sand	0	69
Med / Coarse Fine sand w/ wood and organics	69	71
Sandy silt	71	75
Gravelly sand	75	92
Fine/ Med sand	92	124
Gravelly Fine / medium sand	124	159
Very dense silty clay - Gray	159	159

Received MAY 05 2025 OWRD

Received APR 11 2025 OWRD

RECEIVED NOV 02 2009 WATER RESOURCES DEPT SALEM, OREGON

Date Started 09-04-2009 Completed 10-21-2009

(unbonded) Water Well Constructor Certification

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

License Number 1702 Date 10-22-2009

Electronically Filed

Signed RUSTY R OTTO (E-filed)

(bonded) Water Well Constructor Certification

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License Number 1523 Date 10-22-2009

Electronically Filed

Signed ROBERT STADELI (E-filed)

Contact Info (optional) ____

ORIGINAL - WATER RESOURCES DEPARTMENT

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

Form Version: 0.95

Received APR 12 2025 OWRD

CLAT 53271

CLAT 53271

Page 1 of 1

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

10-22-2009

WELL LABEL # L 59030

START CARD # 1007877

(1) LAND OWNER

Owner Well I.D. PW #14

First Name _____ Last Name _____

Company City of Gearhart

Address 698 Pacific Way

City Gearhart State OR Zip 97138

(2) TYPE OF WORK

☒ New Well ☐ Deepening ☐ Conversion ☐ Alteration (repair/recondition) ☐ Abandonment

(3) DRILL METHOD

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

(4) PROPOSED USE

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

(5) BORE HOLE CONSTRUCTION

Special Standard ☐ Attach copy

Depth of Completed Well 159.00 ft.

BORE HOLE Dia	From	To	SEAL Material	From	To	Amt	sacks/ lbs
10	0	159	Cement	0	93.25	63	S

How was seal placed: Method ☐ A ☐ B ☒ C ☐ D ☐ E

☐ Other

Backfill placed from _____ ft. to _____ ft. Material _____

Filter pack from 93.25 ft. to 159 ft. Material Silica Sand Size 10/20

Explosives used: ☐ Yes Type _____ Amount _____

(6) CASING/LINER

Casing	Liner	Dia	+	From	To	Gauge	Stl	Plstc	Wld	Thrd
●	○	10	☒	2.5	95	0.375	●	○	☒	☐
●	○	10	☐	125	130.7	0.375	●	○	☒	☐
○	○		☐				○	○	☐	☐
○	○		☐				○	○	☐	☐
○	○		☐				○	○	☐	☐

Shoe ☐ Inside ☐ Outside ☐ Other Location of shoe(s) _____

Temp casing ☐ Yes Dia _____ From _____ To _____

(7) PERFORATIONS/SCREENS

Perforations Method _____

Screens Type Spiral Wrap Material 304 SS

Perf/Screen	Casing/ Liner	Screen Dia	From	To	Scrn/slot width	Slot length	# of slots	Tele/ pipe size
Screen		10	95	125	.02			

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

● Pump ○ Bailer ○ Air ○ Flowing Artesian

Yield gal/min	Drawdown	Drill stem/Pump depth	Duration (hr)
200	74.5	89	24

Temperature 53 °F Lab analysis ☒ Yes By Consultant

Water quality concerns? ☐ Yes (describe below)

From	To	Description	Amount	Units

(9) LOCATION OF WELL (legal description)

County Clatsop Twp 6.00 N N/S Range 10.00 W E/W WM

Sec 4 SW 1/4 of the SE 1/4 Tax Lot 100

Tax Map Number _____ Lot _____

Lat ° 0 ' " or _____ DMS or DD

Long ° 0 ' " or _____ DMS or DD

○ Street address of well ● Nearest address

6th Ave and Marion Street, Gearhart, Oregon

(10) STATIC WATER LEVEL

	Date	SWL(psi)	+	SWL(ft)
Existing Well / Predeepening				
Completed Well	09-18-2009			21.8

Flowing Artesian? ☐ Dry Hole? ☐

WATER BEARING ZONES Depth water was first found 10'

SWL Date	From	To	Est Flow	SWL(psi)	+	SWL(ft)
09-12-2009	20	131	200			20

(11) WELL LOG

Ground Elevation _____

Material	From	To
Med / Coarse Fine sand	0	69
Med / Coarse Fine sand w/ wood and organics	69	71
Sandy silt	71	75
Gravelly sand	75	92
Fine/ Med sand	92	124
Gravelly Fine / medium sand	124	159
Very dense silty clay - Gray	159	159

Received
Received APR 21 2025
MAY 05 2025
OWRD
OWRD

RECEIVED
MAR 25 2010
WATER RESOURCES DEPT
SALEM, OREGON

Date Started 09-04-2009 Completed 10-21-2009

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License Number 1702 Date 10-22-2009

Electronically Filed

Signed RUSTY R OTTO (E-filed)

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License Number 1523 Date 10-22-2009

Electronically Filed

Signed ROBERT STADELI (E-filed)

Contact Info (optional) _____

ORIGINAL - WATER RESOURCES DEPARTMENT

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

Form Version: 0.95

CITY OF GEARHART

May 2, 2025

Oregon Water Resources Department
Water Rights Division
725 Summer Street NE, Suite A
Salem, OR 97301

RE: GROUNDWATER RIGHT APPLICATION
City of Gearhart, Oregon
OWRD Application G-19486

Dear OWRD Water Right Applications Coordinator,

The City of Gearhart, Oregon (the City) is submitting this revised Groundwater Right Application to appropriate groundwater for municipal use.

The previous application (G-19486) was withdrawn on December 20, 2024, to allow the City to make some required revisions to the original application and to re-submit a revised application in tandem with the WRD-recommended groundwater flow model.

The City is submitting this application package requesting additional water supply to meet existing and projected water demands through 2045. Specifically, the City is seeking to obtain an additional water right for the period of July through October of each year to supplement the water supply shortfall created under the existing OWRD Permit (G-16390).

As referenced in the previous application, the City's current water right allows for sufficient flow to meet water demands from January through June each year. However, the Permit curtails the flow rate allowed for the months of July through October each year when population and water use demands are at their peak. This seasonal limitation of flow results in the City needing to purchase treated water from the neighboring City of Warrenton. The City has also experienced an unexpected growth in the residential population over the past several years which has put added stress on the City's water system. The increase in population, along with future planned residential developments, has led the City to realize that additional capacity will be required to meet future water demands.

Although Gearhart and Warrenton have a Mutual Organization Understanding (MOU) for Warrenton to provide supplemental water during the peak summer period, Warrenton has indicated that future

planned developments within Warrenton along with anticipated population growth will severely limit Warrenton's ability to be a reliable supplemental water source to Gearhart in the future.

Previous discussions with OWRD personnel have indicated that obtaining a new/additional water right may be difficult due to concerns over surface water flows and saltwater intrusion and suggested that any future application include data and/or a groundwater model that addresses the saltwater intrusion and stream depletion concerns.

To address those concerns, the City has included a Technical Memorandum as part of this application package which includes the analysis of a MODFLOW groundwater model which quantifies the potential for saltwater intrusion and/or impacts to Neacoxie Creek resulting from increased groundwater pumping rates during the high-demand summer months each year.

Should you have any questions regarding the application or the HGS Technical Memorandum/MODFLOW model please do not hesitate to contact me at (503) 738-5501 or Chris Hyatt with Hyatt GeoSciences, LLC at (503) 887-9323.

Respectfully,

Chad Sweet,
Gearhart City Administrator

Enc: OWRD Application for Permit to Use Groundwater
HGS Technical Memorandum
OWRD Form M
Clatsop County Land Use Information Form
OWRD Groundwater Application Fee ($5,870.00)
Gearhart Production Well Logs
Water Right Application Maps (2)
Clatsop County Legal Description and Tax Lot Maps

cc: Michael Maley, PHG – Todd Groundwater
Chris Hyatt, RG - Hyatt GeoSciences, LLC