Feasibility Study Report to Provide Potable Water to the Community of West Glen, OR

Prepared for:
Morrow County, Oregon

Prepared by:

Meier
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Paul M. Giever, P.E., S.E.

Signed by:

REGISTERED PROFESSIONAL ENGINEER 69395PE OREGON JANUARY 19, 2002 PAUL M. GIEVER

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Paul Giever
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1.0 EXECUTIVE SUMMARY

High nitrate levels have been found in many of the wells that supply drinking water to the West Glen area near Boardman, Oregon. This feasibility study was commissioned to determine the most cost-effective permanent solution that reliably provides safe drinking water to the West Glen area. To be a reliable solution, the solution must provide water meeting Environmental Protection Agency (EPA) and State of Oregon requirements for nitrates and other criteria. Additionally, a reliable solution must be permissible under State of Oregon requirements such as permitting or water rights.

Several alternatives were considered to address these challenges, including:

- Implementing point-of-use or point-of-entry (POU/POE) treatment systems at each individual West Glen drinking water user, be it a residence or commercial user.
- Community Well System: Establishing a local water utility or special district under West Glen's jurisdiction.
- Municipal Water System: Extend the City of Boardman's local water utility to West Glen.

Each option was evaluated and assessed for improving and protecting community health, technical feasibility, regulatory compliance, initial capital investment, and long-term operation and maintenance (O&M) responsibilities.

Key Findings:

- The most effective and sustainable long-term solution, from a public health, regulatory compliance, and financial stability perspective, is the extension of the City of Boardman's municipal water service to the West Glen community.
- Formation of a special district is technically possible and would allow for independent governance and funding mechanisms (e.g., tax assessments or utility rates). However, this model requires:
    - Legislative approval.
    - Substantial initial capital investment.
    - Purchasing water rights.
    - On-going governance by a local board.
    - Long-term financial self-sufficiency, which may place a burden on small community water users.
    - More expensive initial cost than the City of Boardman option.
- Household treatment systems using reverse osmosis or nitrate removal cartridges offer a lower initial cost per household. Unfortunately, this option does not reliably ensure safe drinking water.
    - There is no centralized oversight to ensure water quality compliance.
    - Requires regular maintenance (filter replacement, membrane checks).
    - Long-term household costs for O&M would be borne by the household/user.
    - System failures or neglect could expose residents to health risks, particularly vulnerable populations.

Financial Considerations:

Initial capital outlay for extending the City of Boardman's water distribution system is estimated to be $2.7 million for West Glen and Summit Lane, including design and construction and 2 years

of inflation. The total including Paul Smith is $3.5 million. These estimates would include residential meters, disconnecting existing wells from each residence/commercial user, connection to each household/user, and landscaping repair at connections.

The Community Well option would require most of the same water distribution system that the City of Boardman option would but adds the additional cost of land acquisition, a deep community well, a large above ground water storage tank, pumps, and treatment systems. The Community Well option also requires the acquisition of water rights and the creation of an operating board. The cost for this option is estimated to be $6.6 million including design and construction and 2 years of inflation. In summary, the Community Well option is more expensive than the City of Boardman option.

Both the Community Well and City of Boardman options can reliably provide safe drinking water. The City of Boardman option is less expensive than the Community Well option and thus is the chosen option in this Feasibility Study. Additionally, this option leverages the City of Boardman's existing water treatment and distribution infrastructure and regulatory structure, thereby preventing short- and long-term financial burdens to impacted West Glen residents.

2.0 BACKGROUND AND CONTEXT

2.1 COMMUNITY OF WEST GLEN

The West Glen community, located south of the City of Boardman corporate limits, but lies within the city's Urban Growth Area (UGA). The community currently consists of approximately 75 properties including both residential, as well as some small-scale agricultural and commercial plots. West Glen is an unincorporated community, as such, it falls under the jurisdiction of Morrow County which does not provide access to centralized public utility services, such as municipal water.

Currently, the residents of West Glen rely on private domestic wells for their water supply. These wells draw from the regional aquifer system, which has become a continuing concern due to nitrate contamination.

2.2 CITY OF BOARDMAN

The City of Boardman, situated in northeastern Oregon within Morrow County, operates a state regulated municipal water system. Boardman provides drinking water to its residents/customers from three Horizontal Collector Wells drawing water from a shallow aquifer near the Columbia River. The water is then treated to meet federal and state health standards. The City has invested in infrastructure upgrades over the past two decades, establishing its water system as a modern and stable public utility with surplus capacity to serve additional customers within its expanded development area. Additional information can be found at gwp-oregonnitratereductionplan-2024.pdf.

The local economy relies significantly on agricultural operations, livestock operations, and food processing plants. These industries, and their process effluent discharges, are probably some of the contributing factors to the high nitrate environmental impacts affecting West Glen and neighboring rural communities.

2.3 HISTORY OF GROUNDWATER IN THE LOWER UMATILLA BASIN

Origins and Timeline

Nitrate contamination in the regions surrounding West Glen's groundwater has been recognized as an on-going public health and environmental issue for over two decades.

The Oregon Department of Environmental Quality (DEQ) identified portions of Morrow and Umatilla counties (including West Glen) as part of the Lower Umatilla Basin Groundwater Management Area (LUBGWMA), designated in 1990 due to elevated nitrate concentrations exceeding the federal drinking water standard of 10 mg/L.

Impact on West Glen

In West Glen, multiple private residential wells have been tested and have been found to be at, or above, the Maximum Contaminant Level (MCL) for nitrates, posing a risk of serious health conditions to vulnerable groups within the community, such as:

- Infants (e.g., methemoglobinemia or "blue baby syndrome").
- Pregnant women.
- Individuals with compromised health or immune systems.

The lack of consistent monitoring of private wells exacerbates these risks as there is no centralized reporting or remediation protocol in place. Some households have resorted to installing water filtration systems like reverse osmosis or rely on delivered bottled water. However, these measures are costly, may not be effective at removing high level of nitrates, and are not considered to be a long term, sustainable solution.

3.0 OBJECTIVES

3.1 LONG TERM GOALS

The ultimate goal is to evaluate the available solutions in order to provide a permanent and sustainable solution to provide safe drinking water to the residents of West Glen in a manner that is financially viable for all stakeholders.

4.0 TECHNICAL FEASIBILITY

4.1 OPTION 1 – DO NOTHING

The option to maintain the status quo was evaluated but determined to be insufficient as a long-term solution since it does not provide for clean drinking water for the impacted residents of West Glen.

4.2 OPTION 2 – IN HOME TREATMENT SYSTEMS

Typical in-home water treatment systems (Brita, PUR) are designed to remove contaminants such as chlorine and organic compounds using an activated carbon filter media by absorbing them. Brita's disclaimer includes that their products are "Not certified to remove nitrates". PUR's disclaimer instructs that users "Do not use with water that is microbiologically unsafe or of unknown quality without adequate disinfection."

Effective removal of nitrates at moderate well water nitrate levels requires a filtration media that removes dissolved ions, like reverse osmosis. Ionic compounds are those which have a net electric charge, either positive or negative. Reverse osmosis is a pressure-driven water filtration process that forces water through a semipermeable membrane to remove dissolved solids, including nitrates. Dissolved ions, like nitrates, are larger than water molecules and unable to pass through the membrane pores. The pressurized water passes through the membrane allowing water molecules to pass while rejecting dissolved ions.

Reverse osmosis and other point of use systems can be effective at reducing nitrates to below the 10 ppm EPA MCL when initial well water nitrates are measured below 25 ppm. Unfortunately, some of the wells tested in the West Glen area have tested with nitrates in the 40 to 60 ppm range. At 40 to 60 ppm, there are no point of use systems that reliably reduce nitrates to below the EPA MCL level of 10 ppm.
(Reference:
https://www.morrowcountyor.gov/sites/default/files/fileattachments/planning/page/16745/gwp-oregonnitratereductionplan-2024.pdf)

Although not a viable solution since these point of use systems will not reliably provide safe drinking water, this Feasibility Study did investigate costs for a system that provides some but not complete reduction of nitrates. Each fixture used for drinking, cooking, and bathing would require their own treatment unit or there are some whole house type systems. Reverse osmosis systems are a costly solution ranging from $10,000 to $18,000 per installation. To remain effective, the reverse osmosis membrane must be replaced every year, depending on use.

An additional consideration is that many point of use systems are not recommended for households on septic systems, which are used within the West Glen community.

In summary, although point of use systems are generally lower cost than other options, point of use systems are not a viable solution since these systems will not reliably provide safe drinking water (i.e., ensuring nitrates below 10 ppm).

4.3 OPTION 3 – CREATION OF A COMMUNITY WELL SPECIAL DISTRICT

West Glen lies in an unincorporated area of Morrow County, as such, no municipal utilities are provided to the community. Historically, these residents have utilized private wells and on-site septic sewer systems for water and wastewater services. In lieu of being brought into the service area of the City of Boardman, the residents of West Glen could petition the State of Oregon to create a special district for drinking water (i.e., a Community Well System).

Special Districts are a type of local government entity created to provide public water services to communities that are outside of the City boundaries or lack access to a municipal water system. These districts are authorized under Oregon Revised Statutes (ORS) Chapter 264 – Domestic Water Supply Districts. Members of the District Board are elected and voting is only open to the households within their boundaries.

These districts are classified as political subdivisions of the State and are granted legislative powers which can implemented within their respective boundaries. Some of these powers include:

- Construct and operate drinking water systems.

- Levy taxes and fees.
- Issue bonds for infrastructure.
- Acquire land and water rights.
- Enter contracts for engineering, construction, and operations.

The residents of West Glen would elect the Board that would be responsible for operating the Community Well Special District. In turn, the Board would be in complete control of their water supply, distribution, and rates for water usage. The Board would also require that the residents of West Glen to be responsible for providing the capital funds necessary to construct the infrastructure for a regulated public water supply. These costs include but are not limited to:

- Land acquisition.
- Engineering design and permitting.
- Well construction.
- Groundwater pump(s).
- Storage tank(s).
- Treatment system.
- Booster pump(s).
- Distribution system (Piping).

To fund these capital improvement projects, the District might have to issue a municipal bond and use its authority to levy an ad-valorem tax on the land (property tax) within their boundaries. These funds would be used not only for construction, but would also need to include the costs associated with long-term maintenance and repairs to the system infrastructure.

A cost estimate is included in Appendix B. It is estimated the initial construction and design costs would be $6.6 million. The water distribution system to serve residential and commercial lots would be similar to the system in Option 4 (water provided by City of Boardman). Since this option has the additional costs of land acquisition, a deep community well, a large above ground water storage tank, pumps, and treatment systems. This option is considerably more expensive than Option 4. As such, this feasibility study recommends Option 4.

4.4 OPTION 4 – EXPAND THE CITY OF BOARDMAN WATER DISTRIBUTION INFRASTRUCTURE

4.4.1 Existing Infrastructure

The City of Boardman utilizes a closed loop water system that consists of supply, treatment, storage, and distribution infrastructure. The supply sources consist of three Horizontal Collector Wells drawing water from a shallow aquifer near the Columbia River. The water is then treated to meet federal and state health standards. System also has three storage reservoirs, including a 300,000-gallon water storage reservoir and a 300,000-gallon clear well (125,000 gallons available for water storage) for water disinfection (chlorine contact time) and approximately 17.5 miles of piping.

4.4.2 Required System Extensions and Improvements

In order to serve the residents of West Glen, this Feasibility Study included reviewing the current layout and capacity of Boardman's water system and preparing a preliminary distribution layout design (Figure 1) for the West Glen infrastructure.

Discussions with the City of Boardman Public Works Department, as well as reviewing the recent water quality reports and capital improvement plan, it was determined that sufficient capacity is available within their system at present and that no expansion to their production and storage capabilities would be needed in the immediate future.

4.4.3 Engineering Considerations

The Boardman public works director indicated that the preferred connection point be within the new residential development, River Ridge Estates, approximately 0.75 miles northwest of the West Glen community. In addition to the infrastructure to serve West Glen, Morrow County asked that another route be evaluated also provide water service to households west of West Glen along Paul Smith Road, south of Kunze Road.

A preliminary design of the water system was prepared and can be seen in Appendix A, as well as Figure 1 below.

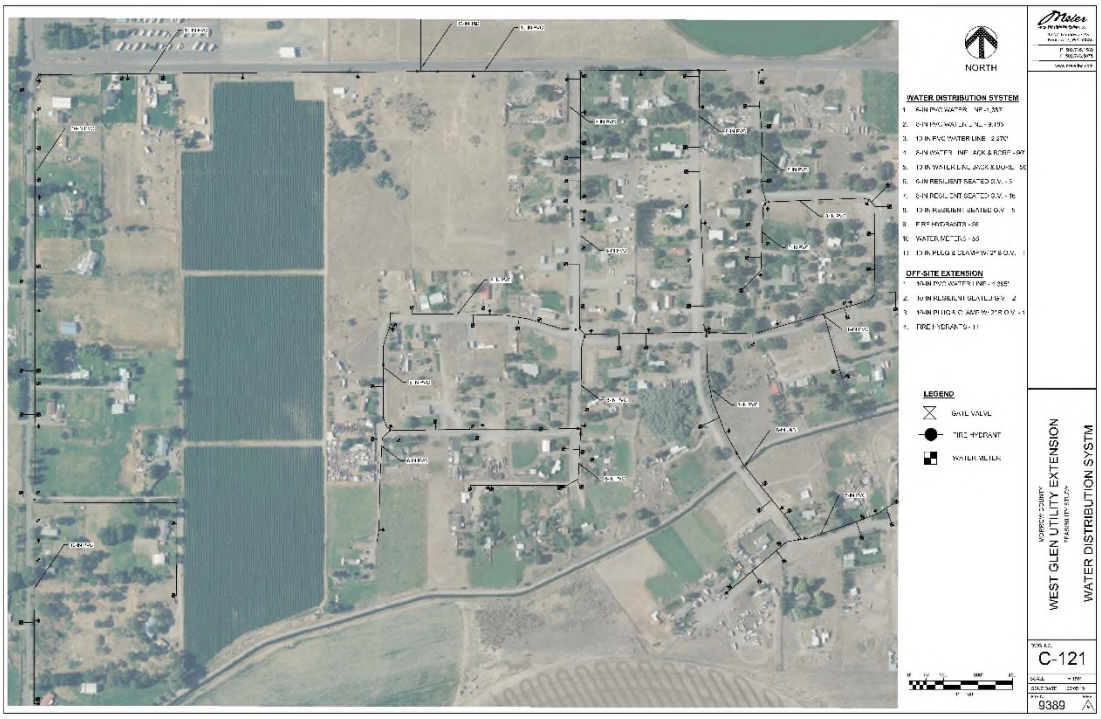


Figure 1: Preliminary Water Distribution System Layout

The estimated cost to construct the system shown above is $2.7 million for West Glen and Summit Lane, including design and construction and 2 years of inflation. The total including Paul Smith is $3.5 million. An itemized preliminary cost estimate can be found in Appendix B.

5.0 ECONOMIC AND FINANCIAL FEASIBILITY

Funding for this study and the subsequently chosen solution are anticipated to be funded through state and federal grants, as well as environmental violation penalty fees and other sources related to prior legal settlements for remediation efforts.

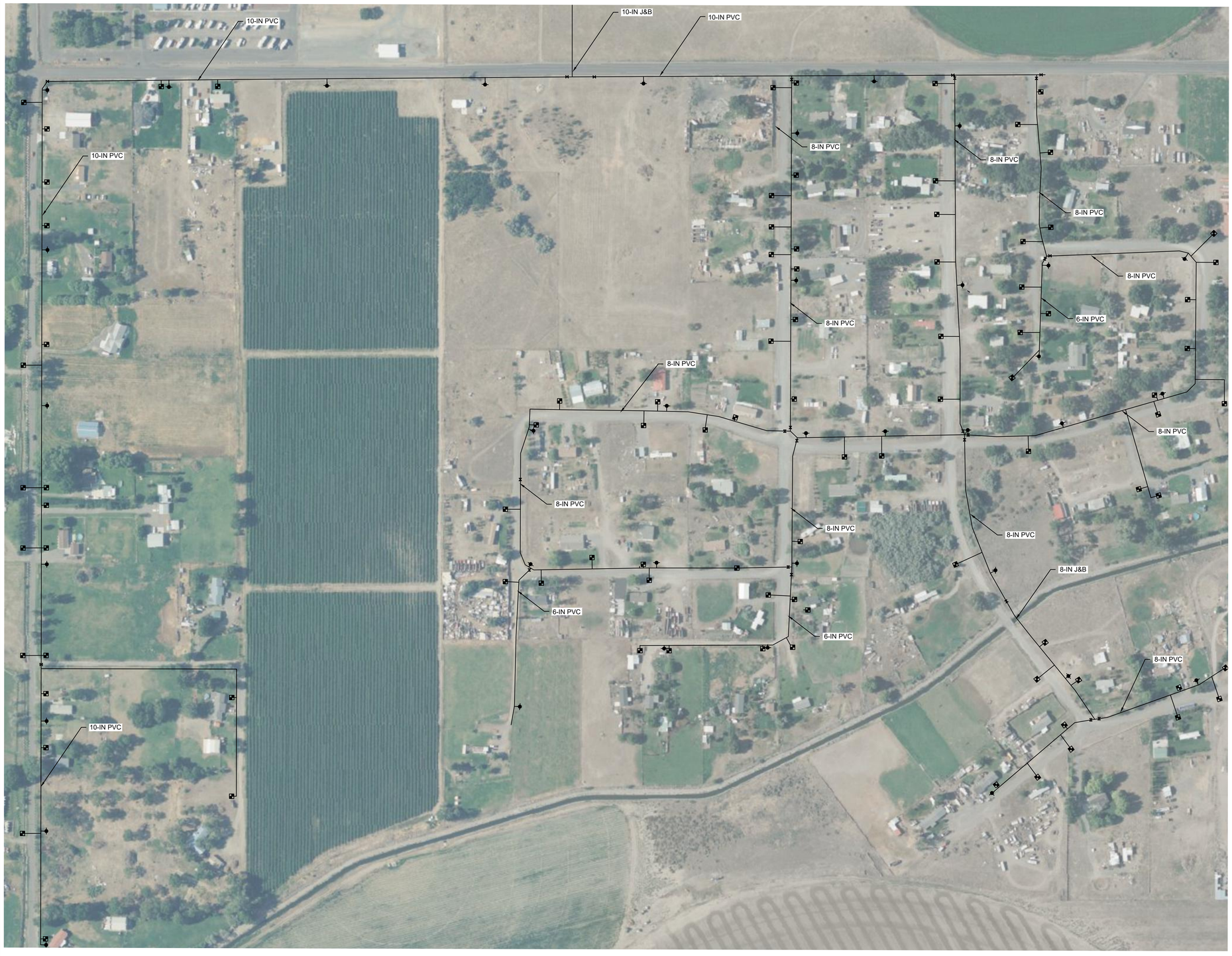
Any solution implemented would have to be done so the benefit improves the community as a whole with even equity.

6.0 CONCLUSION AND RECOMMENDATION

The evaluation of reliable safe potable water solutions for West Glen demonstrates that extending service from the City of Boardman is the most viable, cost effective, long-term option. While household reverse osmosis/point of use systems and the formation of a special Community Well utility district were assessed, both carry significant drawbacks. In-home systems cannot reliably provide safe drinking water and present maintenance and reliability concerns. A new special Community Well utility district would have initial costs greater than the City of Boardman and require on-going administrative costs.

The City of Boardman’s existing infrastructure, regulatory compliance framework, and treatment capabilities make it the most reliable and cost-effective provider. Though the initial investment is substantial, it is offset by reduced long-term risk, improved water quality, and alignment with public health objectives. This report recommends initiating the preliminary engineering, funding applications, and stakeholder engagement necessary to move this solution forward.

Appendix A
Preliminary Water Distribution System Layout



NORTH

WATER DISTRIBUTION SYSTEM

1. 6-IN PVC WATER LINE -1,387'
2. 8-IN PVC WATER LINE - 9,185'
3. 10-IN PVC WATER LINE - 2,270'
4. 8-IN WATER LINE JACK & BORE - 90'
5. 10-IN WATER LINE JACK & BORE - 50'
6. 6-IN RESILIENT SEATED G.V. - 3
7. 8-IN RESILIENT SEATED G.V. - 16
8. 10-IN RESILIENT SEATED G.V. - 5
9. FIRE HYDRANTS - 26
10. WATER METERS - 58
11. 10-IN PLUG & CLAMP W/ 2" B.O.V. - 1

OFF-SITE EXTENSION

1. 10-IN PVC WATER LINE - 4,395'
2. 10-IN RESILIENT SEATED G.V. - 2
3. 10-IN PLUG & CLAMP W/ 2" B.O.V. - 1
4. FIRE HYDRANTS - 11

LEGEND

- GATE VALVE
- FIRE HYDRANT
- WATER METER

0' 75' 150' 300' 450'

1" = 150'

Meier ARCHITECTURE-ENGINEERING, INC.
12 W. Kennewick Ave.
Kennewick, WA 99336
P: 509.735.1589
F: 509.783.5075
www.meierinc.com

MORROW COUNTY

WEST GLEN UTILITY EXTENSION

FEASIBILITY STUDY

WATER DISTRIBUTION SYSTM

DWG. NO. C-121

SCALE: 1" = 150'

ISSUE DATE: 03/05/19

JOB No. 9389

REV. #

Appendix B
Cost Estimate Opinion for City of Boardman Water System

SECTION 1 - WATER DISTRIBUTION SYSTEM

West Glen and Summit Lane

ITEM No.	DESCRIPTION	UNIT	ESTIM. QTY.	UNIT PRICE	TOTAL
	Polyvinyl chloride pipe, AWWA C-900, DR-18, Class 150 waterline, including fittings, thrust blocking and appurtenances with bedding and backfill, all depths, including trench safety, complete in place				
1.	6-inch diameter	L.F.	1,387	$ 40	$ 55,480
2.	8-inch diameter	L.F.	9,185	$ 60	$ 551,100
3.	10-inch diameter	L.F.	2,270	$ 85	$ 192,950
	Total water main length per Meier drawings)		12,842		
	Jack & Bore installation, complete in place				
4.	8-inch diameter	L.F.	90	$ 500	$ 45,000
5.	10-inch diameter	L.F.	50	$ 600	$ 30,000
	Residential service lead, complete in place				
6.	Near side single lead	EA.	34	$ 3,000	$ 102,000
7.	Far side single lead	EA.	35	$ 6,000	$ 210,000
	Total residential leads	EA.	69		
	Resilient Seated Gate Valve with Box, complete in place				
8.	6-inch diameter	EA.	5	$ 1,200	$ 6,000
9.	8-inch diameter	EA.	12	$ 1,800	$ 21,600
10.	10-inch diameter	EA.	4	$ 2,500	$ 10,000
11.	Fire hydrants (16,161 feet of main line / 400 ft max spacing)	EA.	26	$ 5,000	$ 130,000
12.	Installation of residential meter assembly with box, complete in place	EA.	69	$ 750	$ 51,750
13.	Backflow preventer, 1"	EA.	69	$ 500	$ 34,500
14.	Curb Stop, 1", copper	EA.	69	$ 275	$ 18,975
15.	Air release assembly (assume 3 inch, flanged)	EA.	3	$ 8,000	$ 24,000
16.	Wet connection to existing waterline, complete in place	EA.	1	$ 15,000	$ 15,000
17.	Easement acquisition	EA.	4	$ 2,500	$ 10,000
18.	Removal and restoration of landscaping from easement to home connection point	EA.	69	$ 300	$ 20,700
19.	Trench / traffic plates (at intersections, driveways, and 'far side leads' to allow local traffic. Assume max 1 street under construction at one time)	LS	1	$ 20,000	$ 20,000
20.	Traffic control devices (wood barricades with reflective surfaces and flashing lights.)	LS	1	$ 10,000	$ 10,000
21.	Project Management, Field Personnel, 1 Supt, 1 Junior Engineer (RS Means 0131 1320 0260, 0131 1320 0100)	Weeks	18	$ 6,074	$ 109,332
22	Canal Crossing	EA	1	$ 50,000	$ 50,000
	CONSTRUCTION SUBTOTAL: WATER DISTRIBUTION SYSTEM				$ 1,718,387

COST OPINION SUMMARY

Water Distribution System Construction - West Glen & Summit Lane		$ 1,718,387
Engineering	15%	$ 257,758
Performance Bond (RS Means 0131 1390 0xxx)	1.5%	$ 25,776
Builder's Risk Insurance (RS Means 0131 1330 0xxx)	0.6%	$ 10,310
Contingencies at Conceptual Stage	20%	$ 343,677
COST OPINION TOTAL		$ 2,355,909
Consider 7% inflation for 2 Years = 14.49% increase		$ 341,371
COST OPINION TOTAL With 2 Years' Inflation		**$ 2,697,280**

This is a Rough-Order-of-Magnitude (ROM) opinion of probable construction cost.

Notes:
1. No hydraulic modeling has been done for this estimate, so pipe sizes are estimated based on similar systems.
2. The utility may want to upsize the main line to add capacity for future water extensions beyond West Glen.
3. Excavation thru rock is more expensive and has not been included.
4. Likewise, dewatering of excavations was not anticipated or included.
5. Estimate includes one meter and service line to one house/building per lot.
6. No meters or service lines were estimated to empty lots.
7. Utility may want additional looping
8. Estimate is based on the prime Construction Contractor performing all the work.
9. Contingency of 20% is consistent with RS Means for a Conceptual Design (ref RS Means 0121 1600 0020).

SECTION 1 - WATER DISTRIBUTION SYSTEM

Paul Smith

ITEM No.	DESCRIPTION	UNIT	ESTIM. QTY.	UNIT PRICE	TOTAL
	Polyvinyl chloride pipe, AWWA C-900, DR-18, Class 150 waterline, including fittings, thrust blocking and appurtenances with bedding and backfill, all depths, including trench safety, complete in place				
1.	6-inch diameter	L.F.	0	$ 40	$ 0
2.	8-inch diameter	L.F.	0	$ 60	$ 0
3.	10-inch diameter	L.F.	3,622	$ 85	$ 307,870
	Total water main length per Meier drawings)		3,622		
	Jack & Bore installation, complete in place				
4.	8-inch diameter	L.F.		$ 500	$ 0
5.	10-inch diameter	L.F.		$ 600	$ 0
	Residential service lead, complete in place				
6.	Near side single lead	EA.	15	$ 3,000	$ 45,000
7.	Far side single lead	EA.	6	$ 6,000	$ 36,000
	Total residential leads	EA.	21		
	Resilient Seated Gate Valve with Box, complete in place				
8.	6-inch diameter	EA.	0	$ 1,200	$ 0
9.	8-inch diameter	EA.	0	$ 1,800	$ 0
10.	10-inch diameter	EA.	6	$ 2,500	$ 15,000
11.	Fire hydrants (16,161 feet of main line / 400 ft max spacing)	EA.	10	$ 5,000	$ 50,000
12.	Installation of residential meter assembly with box, complete in place	EA.	21	$ 750	$ 15,750
13.	Backflow preventer, 1"	EA.	21	$ 500	$ 10,500
14.	Curb Stop, 1", copper	EA.	21	$ 275	$ 5,775
15.	Air release assembly (assume 3 inch, flanged)	EA.	2	$ 8,000	$ 16,000
16.	Wet connection to existing waterline, complete in place	EA.	0	$ 15,000	$ 0
17.	Easement acquisition	EA.	1	$ 2,500	$ 2,500
18.	Removal and restoration of landscaping from easement to home connection point	EA.	21	$ 300	$ 6,300
19.	Trench / traffic plates (at intersections, driveways, and 'far side leads' to allow local traffic. Assume max 1 street under construction at one time)	LS	0	$ 20,000	$ 0
20.	Traffic control devices (wood barricades with reflective surfaces and flashing lights.)	LS	0	$ 10,000	$ 0
21.	Project Management, Field Personnel, 1 Supt, 1 Junior Engineer (RS Means 0131 1320 0260, 0131 1320 0100)	Weeks	0	$ 6,074	$ 0
22	Canal Crossing	EA	0	$ 50,000	$ 0
	CONSTRUCTION SUBTOTAL: WATER DISTRIBUTION SYSTEM				$ 510,695

COST OPINION SUMMARY

Water Distribution System Construction - Paul Smith		$ 510,695
Engineering	15%	$ 76,604
Performance Bond (RS Means 0131 1390 0xxx)	1.5%	$ 7,660
Builder's Risk Insurance (RS Means 0131 1330 0xxx)	0.6%	$ 3,064
Contingencies at Conceptual Stage (RS Means 0121 1600 0020)	20%	$ 102,139
COST OPINION TOTAL		$ 700,163
Consider 7% inflation for 2 Years = 14.49% increase		$ 101,454
COST OPINION TOTAL With 2 Years' Inflation		**$ 801,616**
Water Distribution System Construction - West Glen, Summit Lane		$ 2,697,280
Water Distribution System Construction - West Glen, Summit Lane &Paul Smith		
COST OPINION TOTAL With 2 Years' Inflation		**$ 3,498,896**

This is a Rough-Order-of-Magnitude (ROM) opinion of probable construction cost.

Notes: 1. For water distribution system estimate notes, see West Glen & Summit Lane.

Appendix C
Cost Estimate Opinion for a Community Well Special District

SECTION 1 - Private Community Well

ITEM No.	DESCRIPTION	UNIT	ESTIM. QTY.	UNIT PRICE	TOTAL
1.	Assumptions: Single 10" diameter well to 700 ft deep.	L.F.	700	$ 60.00	$ 42,000
	Adjusted Unit Price from RS Means, "Public water supply wells, wells domestic water, drilled, 8" diameter, normal soil"	L.F.		$ 48.12	$ 0
					$ 0
2.	Pump, general utility, centrifugal, end suction, horizontal base mounted, vertical split case, rated @ 100' head, single stage, 1,500 GPM, 60 H.P., 6" discharge, includes drip proof motor	Ea.	2	$ 42,350.60	$ 84,701
	Motor Controls (lead/lag, etc.) for well pumps, incl. engineering and installation	Ea.	1	$ 20,000.00	$ 20,000
					$ 0
3.	Water Storage Tank (nominal 1 million gallons, steel, assume site-built as too big to fab and transport.)	Ea.	1	$ 1,447,884.00	$ 1,447,884
	Tank foundation, concrete, 12 inch, excludes forms and reinforcement	S.F.	5600	$ 13.66	$ 76,496
	Tank foundation, concrete, 2' x 2' thickened edge	L.F.	230	$ 111.29	$ 25,597
	Slab edge formwork	SFCA	230	$ 7.67	$ 1,764
	Slab reinforcement. Assume #5 each way at 12" on center, top and bottom mats	Ton	16.8	$ 3,918.00	$ 65,822
	Concrete, ready-mix, air entrainment admixture and plasticizer	C.Y.	230.0	$ 5.00	$ 1,150
	Concrete finishing	S.F.	0	$ 1.42	$ 0
	Hydropneumatic (expansion) tank (Assume 5,000 gallon)	Ea.	1	$ 20,000.00	$ 20,000
	Structural concrete, in place, equipment pad (3000 psi), 10' x 10' x 12", includes forms(4 uses), Grade 60 rebar, concrete (Portland cement Type I), placing and finishing	Ea.	1	$ 2,496.24	$ 2,496
					$ 0
4.	Distribution pumps, 1500 gpm, 60 HP	Ea.	2	$ 42,350.60	$ 84,701
	Motor Controls (lead/lag, etc.) for distribution pumps, incl. engineering and installation	Ea.	1	$ 20,000.00	$ 20,000
	Underground service installation, includes excavation, backfill, and compaction, 100' length, 4' depth, 3 phase, 4 wire, 277/480 volts, 600 A w/switchboard	Ea.	1	$ 31,171.00	$ 31,171
	Transformers, 4,800 volts to 480/277 volts, 225 kVA	Ea.	1	$ 41,198.31	$ 41,198
	Transformer handling	Ea.	1	$ 1,655.85	$ 1,656
	Utility Vault	Ea.	1	$ 5,961.13	$ 5,961
	MCC (not needed with VFDs)				$ 0
	Variable frequency drives, enclosed, 460 volt, 60 HP motor size, NEMA 1	Ea.	4	$ 16,580.98	$ 66,324
					$ 0
5.	Jockey pump, diesel, for backup and fire protection	Ea.	2	$ 124,006.00	$ 248,012
	Vibration isolators,	Ea.	2	$ 302.26	$ 605
	Pre-engineered metal building, 20' x 48', 14 ft eave height, (to house 2 distribution pumps, 5000 gallon hydropneumatic tank, 2 diesel jockey pumps, 480V switchgear, excludes foundation and floor)	SF Flr.	960	$ 55.00	$ 52,800

R30 insulation (walls and roof), vinyl faced	S.F.	2864	$ 5.20	$ 14,893
3070 Door Framing	Opng.	1	$ 657.34	$ 657
3070 door	Opng.	1	$ 1,791.60	$ 1,792
10' x 10' rollup door	Ea.	1	$ 2,767.48	$ 2,767
Weatherstripping package, jambs	L.F.	30	$ 2.92	$ 88
Weatherstripping package, sill	L.F.	10	$ 19.58	$ 196
Electric Unit heaters	Ea.	2	$ 1,506.57	$ 3,013
Foundation and floor slab	Ea.	1	$ 11,000.00	$ 11,000
Project Management, Field Personnel, 1 Supt, 1 Junior Engineer (RS Means 0131 1320 0260, 0131 1320 0100)	Weeks	26	$ 6,074	$ 157,924
Inspections: Soil (1 test per 500 lf trench) (RS Means	Ea.	4	$ 600	$ 2,400
Final Cleanup & Restoration	L.S.	1	$ 5,000	$ 5,000
Alternate: Private Community Well				**$ 2,540,068**
Engineering		20%		$ 508,014
Performance Bond (RS Means 0131 1390 0xxx)		1.5%		$ 38,101
Builder's Risk Insurance (RS Means 0131 1330 0xxx)		0.6%		$ 15,240
Contingencies at Conceptual Stage		20%		$ 508,014
Disribution System (West Glen and Summit Lane) See separate cost estimate. Use 90% since slight less piping.		90%	$ 2,355,909	$ 2,120,318
COST OPINION TOTAL				$ 5,729,755
Consider 7% inflation for 2 Years = 14.49% increase				$ 830,241
COST OPINION TOTAL With 2 Years' Inflation				**$ 6,559,996**

This is a Rough-Order-of-Magnitude (ROM) opinion of probable construction cost.

Notes:
1. For water distribution system estimate notes, see Appendix B.
2. Land acquisition costs have not been included.
3. Costs to set up the Board have not been included.
4. Since no design has been completed, cost and size of tanks, wells, pumps, filtration system, etc. are very rough and subject to change.
5. Contingency of 20% is consistent with RS Means for a Conceptual Design (ref RS Means 0121 1600 0020).
6. Although estimate is a rough order of magnitude, since the Community Well must include at least 90% of the water distribution system from Appendix B, the Community Well option will be millions more than the extension of the City of Boardman