



DRAFT TECHNICAL MEMORANDUM

Polk County Regional Water Supply Concept

To: Austin McGuigan, Polk County Community Development

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Attachments: Attachment 1 – Preliminary Cost Estimate Tables

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Executive Summary

This technical memorandum is the second deliverable in the Polk County Regional Water Supply Study. It presents a preliminary regional water supply concept using the water rights available to the Polk County Municipal Water Providers (PCMWP¹). Polk County's (County's) goal with this project is to equitably improve water supply resilience and reliability throughout the County, centered around a regional Willamette River water supply.

The regional supply concept relies on the use of four existing Willamette River water use permits. The Polk County permit (S-54681) has conditions that limit the supply reliability, particularly in the higher demand periods in late spring and summer. The more senior City of Adair Village permit (S-35819) also has conditions that affect the summer periods but are not as restrictive. The cities of Independence and Monmouth hold their own Willamette River permits (S-54331 and S-54332, respectively) that are smaller than the Polk County and Adair Village permits, but currently do not have conditions limiting the authorized diversions.

The City of Dallas is an important partner in the development of regional Willamette River water supply because it is a major demand center and hub for serving water providers in the north and western areas of the County. Independence, Monmouth, and Dallas each have their own plans for long-term supply needs. While both Independence and Monmouth have relied on groundwater for their water supply, further groundwater development poses some challenges with respect to long-term capacity. Dallas is currently focused on developing additional storage on Rickreall Creek to meet its long-term summer peak demands, but a regional supply could provide supply redundancy, or be an alternative if permitting of new storage becomes problematic.

Based on a preliminary assessment of water use permit conditions, a reliable summer capacity of 13 to 16 million gallons per day (mgd) appears feasible for a regional supply. Various operational concepts and service area scenarios can be served with this capacity. Preliminary, planning-level cost estimates for a Willamette River intake, a water treatment plant (WTP), and water transmission pipelines to serve

¹ The PCMWP, as defined in Settlement Agreement for the Extension of time for S-35819 include "yet unnamed entities providing water for municipal use within the boundaries of Polk County."

Independence and Monmouth is on the order of \$84 million. The total cost to also serve City of Dallas is approximately \$126 million with the addition of 55,000 feet of 20-inch pipeline and pump station (\$42 million). The other smaller communities may also benefit but the costs are significantly greater (an additional \$58 to \$89 million) to convey water through the miles of pipeline that would be needed.

While these costs may seem significant, a regional supply from the Willamette River provides long-term reliability and resiliency. The Willamette River Basin is the largest watershed in Oregon with surface water available for supply development and provides overall resiliency against climate change uncertainties on existing supplies. A regional supply also provides opportunities for cost-sharing where federal and state funding seeks to maximize regional, shared benefits.

1. Introduction

Polk County and its communities have for many years been seeking a long-term water supply to meet growing water needs. The Willamette River can provide a substantial amount of water to help meet the water needs of communities in the County. After completing the *Polk County Regional Water Supply Strategy* in 2005 (HDR-EES, 2005), and identifying long-term water needs, Polk County applied for and secured a Willamette River water right permit (S-54681). The County also obtained access to water that can be developed under an Adair Village Willamette River water right permit (S-35819). Individual communities have continued efforts to meet their own water supply needs. However, communities face many challenges developing new water supplies, including economic and environmental complexities.

The County's goal with this project is to equitably improve water supply resilience and reliability throughout the County, centered around a regional Willamette River water supply. The project has the following overall scope:

1. Understand the long-term water needs of communities and their existing sources of supply.
2. Define a regional supply concept that can help address those needs.
3. Develop preliminary engineering and cost estimates for the regional supply concept.
4. Identify interested communities and water providers.
5. Evaluate possible governance models; and finally.
6. Prepare a "road map" document for implementing the water regional supply concept.

This technical memorandum summarizes the second step in the project to develop a preliminary regional water supply concept using the water rights available to the PCMWP. This initial draft is intended to be a point of reference for discussion at an upcoming workshop with the communities in Polk County (scheduled for May 13, 2022). The results of the workshop will then be used to obtain input from water providers to further develop the regional supply concept for evaluation in the next tasks for the project.

2. Summary of Water Needs

The *Polk County State of Water Supply Needs Technical Memorandum* prepared by GSI Water Solutions, Inc. (GSI) summarizes the projected water demands for the Polk County water providers. The information was also presented at a stakeholder meeting on December 6, 2021, with request for comments and revisions. GSI prepared a final version dated August 9, 2022 based on feedback received. Updated information in the final version is reflected in this tech memo.

The water demand information is used for preliminary planning purposes at this stage of the project. Subsequent changes to the demand projections are not expected to substantively affect the regional concept considerations and preliminary cost estimates presented in this technical memo. **Table 1** summarizes relevant information for the discussion in later sections of this memorandum.

Table 1. Summary of Water Needs¹

City	50-year Period (2072)		Reliable Capacity from Current Supply (mgd)	Deficiency for Meeting MDD (mgd)
	Average Day Demand (mgd)	Maximum Day Demand (mgd)		
(A)	(B)	(C)	(D)	(E)
Independence	3.3	6.7	3.0	3.7
Monmouth	2.3	5.8	2.9	2.9
Dallas ²	6.9	14.2	6.0 ³	8.2
Total	12.5	26.7	11.9	14.8

Notes

¹ Values are rounded to the nearest tenths place, and may not exactly match the values in the *Polk County State of Water Supply Needs Technical Memorandum* (GSI, 2021).

² Values for City of Dallas have been updated based on input received since the December 6, 2021, stakeholder meeting.

³ This is an estimate based on information from the 2018 Water Supply Study (Jacobs, 2018). The 6 mgd is based on 1 to 2 mgd reliable supply from Rickreall Creek with 4 to 5 mgd reliable supply from Mercer Reservoir storage release taking into account a range of drought conditions.

MDD = maximum day demand

mgd = million gallons per day

3. Willamette River Water Rights for the Regional Water Supply Concept

The water rights of interest for the Willamette River regional supply concept include those held by Polk County and Adair Village, and those held individually by the cities of Independence and Monmouth. This section summarizes these water rights and the permit conditions that affect their use in a regional concept.

3.1 Summary of Water Use Permits

The two water use permits of interest to the County for leveraging into a potential regional supply include the Polk County and Adair Village permits for diversion of water from the Willamette River for municipal use. Both permits include limitations and conditions that could limit access to water under the permits, as further described below. **Table 2** summarizes key information about the two permits, including the maximum rate available to PCMWP, in accordance with the conditions of the permit and other agreements.

The water rights include additional conditions² that can limit diversion from the maximum authorized rates as follows:

- That the water provider obtain access to a portion of the water under the water right through submittal of a Water Management and Conservation Plan (WMCP) demonstrating a need for the water.
- That the water provider reduce or cease diversion of water if flow targets identified in the water right are not met.

² The permit extension and settlement agreement for the Adair Village permit also includes conditions related to water conservation, including annual conservation messaging.

Table 2. Summary of Willamette River Water Rights Available to Polk County Municipal Water Providers

Name on Water Right	Permit Number	Completion Date	Maximum Water Right Rate (cfs)	Maximum Rate Available to Polk County Municipal Water Providers (cfs)	Diversion Reduction Condition
Polk County	S-54681	10/29/2030	25.0 (16.2 mgd)	25.0 (16.2 mgd)	On/Off
Adair Village	S-35819	10/1/2050	82.0 (53.0 mgd)	16.0 (10.3 mgd)	Share the Shortfall (based on water right rate). Limited to 30% year-round

Notes

cfs = cubic feet per second
 mgd = million gallons per day

Currently, PCMWP do not have access to water under either permit. The Oregon Water Resources Department (OWRD) approved Polk County’s WMCP in 2018, but Polk County did not request access to water under Permits S-35819 or S-54681. The portion of a right to which a permit holder has access to is referred to as their “greenlight water.”³ Polk County or individual water providers will need to submit a WMCP requesting access to greenlight water under either permit and obtain OWRD approval of a specific requested rate.

Additionally, Permits S-35819 and S-54681 require the water provider to reduce or cease diversion of Willamette River water when certain Willamette River flow targets are not met.⁴ These conditions generally fall into one of two categories: “share the shortfall” or “on/off.” Polk County Permit S-54681 includes an on/off condition, prohibiting any diversion of water under the water right when the flow target is not met. Adair Village’s Permit S-35819 includes a share the shortfall condition, with the maximum diversion reduction capped at 30 percent of the water right rate.

It should be noted that the Adair Village permit extension final order capped the use of that permit by the County in combination with the County’s permit to 25 cfs. For example, if 16 cfs is available under the Adair Village Permit S-35819, a maximum of 9 additional cfs would be available under Polk County Permit S-54681, regardless of flow conditions. Polk County has until 2050 to develop the 16 cfs under Adair Village’s Permit S-35819.

³ The requirement to obtain access to water under a permit (often referred to as greenlight water) is imposed through the municipal permit extension process and is granted through approval of a WMCP.

⁴ These conditions are recommended by the Oregon Department of Fish and Wildlife to protect fish species listed as threatened or endangered under the state or federal endangered species acts

3.2 Water Availability under Polk County and Adair Village Water Rights

3.2.1 OWRD Flow Target Conditions

To demonstrate the potential impacts of the water right conditions on the ability to divert water, GSI compared the flow targets for the water rights described in Section 3.1 to the minimum 7-day rolling average streamflows 2000 through 2021. This period of record was chosen to incorporate data from all years after the U.S. Army Corps of Engineers (USACE) began to manage outflows from the Willamette Valley Project reservoirs to meet Biological Opinion flow targets. Prior to 2000, Willamette River flows were frequently well below the flow targets specified in the water rights of interest throughout the spring and summer months. GSI then assessed the frequency that flow targets were missed under the lowest recorded stream flow scenarios, as well as the extent and duration of diversion reduction that would have been required.

It is important to note that the stream flow at the Salem Gage (14191000), and therefore the historical stream flow patterns described in this memorandum, are a function of how the USACE manages the outflow of the Willamette Valley Project reservoirs. The USACE manages the reservoirs to meet target flows described in the Biological Opinion governing operation of the Willamette Valley Project. Consequently, stream flow patterns may change if priorities regarding the timing and amount of flow are revised in the future. **Table 3** shows the number of days and date range that flow targets were not met under Polk County Permit S-54681. These numbers are similar to those for Adair Village Permit S-35819.

Table 3. Days and Date range Flow Targets were not met under Permit S-54681, 2000–2021

Year	Range (First and Last Day Flow Targets Were Missed)	Maximum Number of Consecutive Days Flow Targets Are Missed
2000	April 6–June 12	4
2001	April 1–August 24	91
2002	June 15–June 30	2
2003	May 28–June 30	13
2004	April 1–May 29	39
2005	April 29–April 30	2
2006	<i>Target not missed</i>	0
2007	April 7–June 30	29
2008	<i>Target not missed</i>	0
2009	<i>Target not missed</i>	0
2010	<i>Target not missed</i>	0
2011	<i>Target not missed</i>	0
2012	<i>Target not missed</i>	0
2013	April 1–June 15	21
2014	June 6–June 9	4
2015	April 1–September 16	147
2016	April 10–June 30	37
2017	<i>Target not missed</i>	0
2018	April 6–June 30	24
2019	April 2–June 15	15
2020	April 1–June 9	40
2021	April 1–August 17	82

Table 4 shows the authorized diversion under minimum recorded streamflows on a monthly basis from 2000 through 2021. Flow targets have been missed at least once from April through September. Reduction in authorized diversions under Adair Village Permit S-35819 is greatest during April through June, when high-flow targets are missed by the greatest relative amount.

Table 4. Reduction in Authorized Diversion under the Lowest Recorded Streamflows, 2000–2021

Time Period	Salem Gage Flow Targets (cfs) Permit S-35819/ Permit S-54681	Minimum 7-day Rolling Average Flow of Record, 2000–2021	Date of Occurrence	Authorized Diversion (cfs) at Minimum 7-day Rolling Average Flow, 2000-2021		Total Authorized Diversion (cfs)	Total Authorized Diversion (mgd)
				Permit S-35819 (Adair Village)	Permit S-54681 (Polk County)		
January	6,000	10,626	1/23/2001	16.0	25.0	25.0	16.2
February	6,000	9,040	2/14/2005	16.0	25.0	25.0	16.2
March	6,000	6,543	3/20/2005	16.0	25.0	25.0	16.2
April 1 - 15	15,000/ 19,200	13,086	4/1/2020	14.0	0.0	14.0	9.0
April 16 - 30	17,000	10,486	4/30/2021	11.2	0.0	11.2	7.2
May	15,000	8,717	5/31/2015	11.2	0.0	11.2	7.2
June 1 - 15	12,600	7,143	6/15/2015	11.2	0.0	11.2	7.2
June 16 - 30	8,500	6,354	6/30/2015	12.0	0.0	12.0	7.7
July	5,630	5,176	7/30/2001	14.7	0.0	14.7	9.5
August	5,630	5,229	8/1/2001	14.9	0.0	14.9	9.6
September	5,630	5,327	9/1/2015	15.1	0.0	15.1	9.8
October	5,630	6,449	10/11/2015	16.0	25.0	25.0	16.2
November	6,000	6,191	11/23/2018	16.0	25.0	25.0	16.2
December	6,000	6,150	12/12/2002	16.0	25.0	25.0	16.2

3.2.2 Potential Conversion of Willamette River Minimum Perennial Streamflows for Natural Flow and Stored Water

Under the Willamette Basin Program, the section of the Willamette River at the Adair Village intake has an unconverted minimum perennial streamflow (MF-184) for 1,750 cfs of natural flow year-round measured at the U.S. Geological Survey (USGS) Albany Gage 14174000 for supporting aquatic life. There is also an unconverted minimum perennial streamflow (MF-183) from the Albany Gage to the Salem Gage 14191000. A minimum perennial streamflow is an administratively established flow. The Willamette Basin Program identifies minimum perennial streamflows throughout the Willamette Basin. In 1987 a law was passed requiring the “conversion” of these flows into instream water rights. The priority date for MF-184 and MF-183 when converted to an instream water right is June 22, 1964, which is senior in priority to Permits S-35819 and S-54681.

In addition, the Willamette Basin Program includes unconverted minimum perennial streamflows for water stored in the USACE reservoirs (the Willamette Valley Project) upstream from the City of Albany. Stored water minimum perennial streamflow would protect released stored water in the Willamette River above the Salem and Albany Gages where the authorized points of diversion for Permits S-35819 and S-54681 are located. The process, timing, and ultimate outcome of converting the stored water component of the minimum perennial streamflows to instream water rights is uncertain. It is unclear whether the conversion of the minimum perennial streamflows or protection of stored water releases would affect availability of water under Permits S-35819 and S-54681. Polk County and its water providers should continue to monitor discussions and state and federal processes surrounding conversion of the minimum perennial streamflows (natural flow and stored water) and to provide comments as opportunities arise for public input.

3.3 Willamette River Water Rights Held by the Cities of Independence and Monmouth

The cities of Independence and Monmouth hold their own Willamette River water use permits. The diversion of water under these two permits are not conditioned with Willamette River target flows, and furthermore are not subject to permit extension rules that require a “fish persistence” review by Oregon Department of Fish and Wildlife. Thus, the Independence and Monmouth water use permits can be leveraged to improve the reliability and capacity for the regional supply, specifically during the high-water demand periods in late spring and summer. In turn, developing them under a regional approach offers potential benefits from a permitting and funding perspective because:

- Independence has two water rights on the Willamette: (i) T-12773 authorizes 2 cfs (1.29 mgd) with a 1954 priority date; and (ii) S-54331 authorizes 4.46 cfs (2.93 mgd) with a 2005 priority date.
- Monmouth has a “duplicate” water right under permit S-54332 that also authorizes 4.46 cfs (2.93 mgd) with a 2005 priority date.

3.4 Water Availability for Combined Willamette River Water Rights

Table 5 lists the reliability of a Willamette River source taking into account the flow target conditions for the Polk County and Adair Village water use permits, and the authorized diversions under the Independence and Monmouth water use permits. This does not include the City of Independence’s 1.29 mgd water right (T-12773). As **Table 5** shows, a supply capacity of 13.0 to 15.6 mgd in the late spring to summer periods may be reasonably expected when all four water use permits are included. When not reduced due to flow target conditions in the winter months, the total authorized diversions range from 16.2 mgd (Polk County and Adair Village permits only) to 21.9 mgd (all four permits). If the additional Independence water right (T-12773) is included, then that total summer capacity could be approximately 16.9 mgd.

Table 5. Expected Available Water from Willamette River Supply with Permit Conditions

Month	Permit S-35819 ¹ (Adair Village) (cfs)	Permit S-54681 ² (Polk County) (cfs)	Independence Authorized Diversion (cfs)	Monmouth Authorized Diversion (cfs)	Total Authorized Diversion (Polk County and Adair Village) (cfs)	Total Authorized Diversion All Permits (cfs)	Total Authorized Diversion All Permits (mgd)	Total Authorized Diversion (Polk County and Adair Village only) (mgd)	Total Authorized Diversion (No Adair Village) (mgd)
January	16.0	25.0	4.46	4.46	25.0	33.9	21.9	16.2	21.9
February	16.0	25.0	4.46	4.46	25.0	33.9	21.9	16.2	21.9
March	16.0	25.0	4.46	4.46	25.0	33.9	21.9	16.2	21.9
April	14.0	0.0	4.46	4.46	14.0	22.9	14.8	9.0	5.8
May	11.2	0.0	4.46	4.46	11.2	20.1	13.0	7.2	5.8
June	11.2	0.0	4.46	4.46	11.2	20.1	13.0	7.2	5.8
June 1-15	11.2	0.0	4.46	4.46	11.2	20.1	13.0	7.2	5.8
June 16-30	12.0	0.0	4.46	4.46	12.0	20.9	13.5	7.7	5.8
July	14.7	0.0	4.46	4.46	14.7	23.6	15.3	9.5	5.8
August	14.9	0.0	4.46	4.46	14.9	23.8	15.4	9.6	5.8
September	15.1	0.0	4.46	4.46	15.1	24.1	15.6	9.8	5.8
October	16.0	25.0	4.46	4.46	25.0	33.9	21.9	16.2	21.9
November	16.0	25.0	4.46	4.46	25.0	33.9	21.9	16.2	21.9
December	16.0	25.0	4.46	4.46	25.0	33.9	21.9	16.2	21.9

Notes

¹ Available for Polk County Municipal Water Providers.

² Available (place of use) for “water districts and cities of Buell Red Prairie, Rock Creek, Rickreall, Perrydale-Rickrell, Perrydale, Luckiamute, Grand Ronde-Rock Creek, Dallas, Monmouth, Independence.”

cfs – cubic feet per second

mgd – million gallons per day

4. Current Supply Plans by City (Independence, Monmouth, and Dallas)

The regional supply concept for Polk County relies on the participation of the cities of Independence and Monmouth, because of their proximity to the Willamette River, and the ability to leverage their own Willamette River water rights. The City of Dallas is also an important participant because it is a major water demand center and geographically necessary if any community(s) further north and west can benefit from the regional supply. The subsections below provide a brief overview of these communities' existing sources of supply and current plans to develop their individual supplies to meet water needs into the future.

4.1 Independence

The City of Independence currently relies on groundwater sourced from wells at two separate well fields, the South and Polk wellfields, and the City's Park Well. The current capacity of these wells is 2,105 gpm (3.03 mgd) in the summer period. The City also has wells at the Willamette River wellfield; however, these are inactive. All of the wells that supply water to the City are constructed in either "younger" (Polk Wellfield) or "older" (South Wellfield) unconsolidated alluvium (sand and gravel) formations. Independence has an emergency source of supply via a bi-directional interconnection with the City of Monmouth.

The City of Independence is in the process of preparing a water system master plan update and Water Management and Conservation Plan (WMCP). The preliminary review from the Polk County State of Water Demands indicates that Independence may need additional supply by early 2030s⁵. Several of the permits have conditions that may limit appropriations seasonally. In addition, Independence and Monmouth have encountered issues with long-term production reliability of some existing wells. The Willamette River Wellfield, being developed in partnership between Independence and Monmouth, is considered groundwater under the influence of surface water and would likely need to meet surface water treatment requirements. The pending Water Master Plan being prepared by Westech recommended the City forgo developing the Willamette Wellfield, and focus on: (1) investigating potential opportunities in the vicinity of the City to obtain additional groundwater rights; and (2) pursuing use of source water from the Willamette River using either a direct intake in the river or a collector well.

4.2 Monmouth

The City of Monmouth obtains its water supply exclusively from four individual groundwater wells. Two of these wells are in the 4th Street Well Field, and the other two wells are in the Marion County Wellfield. The total current capacity of the groundwater supply is 1,980 gpm (2.85 mgd). Based on its 2020 Water Master Plan, future water supplies are projected to be divided between the Willamette River Wellfield (500 gpm), the Independence Corvallis Road and 4th Street Wells (430 gpm) and the Marion County wells (2,050 gpm). This will increase the total system capacity to 2,980 gpm (4.29 mgd) by 2040. As noted above, the Willamette River Wellfield would likely need to meet surface water treatment requirements.

As noted in the 2020 Water Master Plan, the existing wells are exposed to potential water quality concerns and long-term production reliability. As with Independence, a regional supply from the Willamette River could provide a reliable alternate source for redundancy that Monmouth can transition into its long-term primary source.

4.3 Dallas

Dallas obtains its drinking water supply from Rickreall Creek. The City's water rights authorize storage and diversions of water from the creek at the City's Mercer Reservoir site. The City also has an aquifer storage and recovery (ASR) system, which the City has indicated will not be operated in the long-term. From late June

⁵ At the time of this tech memo, the pending Water Master Plan for City of Independence stated a supply deficiency (compared to maximum day demand) may occur by 2033 and a deficiency of 825 gpm by 2045.

through early October, and especially late summer, the natural river flows fall below the City's withdrawal needs, and water released from Mercer Reservoir into Rickreall Creek is used to supplement natural creek flows. A 2018 study (Jacobs, 2018) determined that a severe drought year could result in a need for curtailment in the near-term, and as a result Dallas is currently pursuing installing a new dam on Rickreall Creek upstream of Mercer Reservoir or on a tributary to Rickreall Creek. In addition to expanded raw water supply from additional storage, Dallas would need to expand its WTP capacity from its current 8 mgd to meet long-term summer demands.

If Dallas moves ahead with its planned addition of storage, Dallas could participate in a Polk County regional supply strictly for emergency or supply redundancy. If expansion of storage encounters significant permitting issues, Dallas could look to the regional supply to meet part of its long-term summer deficiencies, assuming Independence and Monmouth would use some of the available capacity from the regional supply.

5. Regional Water Supply Concept

The capacity of the regional supply concept is largely constrained by the water right permit conditions as discussed in Section 3. The reliable summer (peak season) capacity of the regional supply ranges from 13.0 to 16.9 mgd if all the permits are included. Based on this range, the preliminary operational concept (or level of service) for the regional supply is based on a 16 mgd limitation.

Independence and Monmouth are considered baseline participants in developing a Polk County regional supply. Dallas could benefit from diversifying its source of supply and would be a central component of a pipeline transmission route to serve water providers in the north and northwest areas of Polk County. The other smaller water providers could also benefit from the regional supply, but water conveyance costs are a major factor, especially considering the relatively small water demands that would be served by the miles of additional pipeline. Thus, the regional concept is focused on establishing a baseline to serve Independence, Monmouth, and Dallas, with consideration of if/how other smaller systems would be served.

5.1 Regional Supply Operational Concepts

The water providers can seek to use the regional supply to meet various supply resiliency goals, including:

- Meet long-term supply deficits not met by existing or imminent sources of supply.
- Partial or full replacement of existing sources of supply (e.g., due to failing or unreliable production).
- Partial or full redundancy (secondary or emergency) source of supply.

Based on the current supply needs of and planning by Independence, Monmouth, and Dallas, and the reliable summer capacity of the regional supply noted above, the following regional supply operational concepts are considered:

1. **Long-term primary supply for Independence and Monmouth:** The two cities would transition to the Willamette River as their primary supply and use their existing supply for back-up/emergency supply.
 - This option may not be considered a true "regional" option, but it would provide significant resiliency to the two cities.
 - Regional benefits to secure funding may be less justifiable.
2. **Provide supply to meet 50-year supply deficiencies for Independence, Monmouth, and Dallas:** The three cities would use the Willamette River to meet their supply deficiencies (to meet maximum day demand [MDD]) through the 50-year period.

- The three cities would continue to use their existing supplies for their primary supply (i.e., to meet average day demand [ADD]) and use the Willamette River to meet peak demands (i.e., summer demands or MDD) in the long term.
3. **Provide year-round average day demands for Independence, Monmouth, and Dallas:** The three cities would transition to the Willamette River as their primary supply to meet winter/average day demands and use existing supplies to meet summer/maximum day demands.

The specific water demands associated with each water provider and scenario are subject to change and refinement as part the next steps in this project, but the uncertainty in the water demands is considered acceptable for purposes of this preliminary planning process. **Table 6** lists the range of possible capacities under the combination of scenarios. For purposes of this initial comparison, it is assumed that a regional supply capacity of 16 mgd will be developed to address the operational concepts. The overall infrastructure needs for these operational concepts are similar, as discussed in Section 6. However, as the concept is developed further with specific levels-of-service for each participating water provider, the infrastructure requirements and cost share parameters will likely differ for each scenario.

5.2 Water Rights and Implementation Considerations

As noted in Section 3, all four of the Willamette River water right permits have not yet been developed and will need permit extensions based on the anticipated timing of supply development work being on the order of decades. The points of diversion will also need to be changed to a common location near Independence.

A water use permit holder with a non-expired permit completion date may, in certain circumstances apply to amend a permit to change the place of use. The permit holder can also propose to change the location of an authorized point of diversion (POD). The other terms and conditions in the permit cannot be changed. OWRD will review the permit amendment to ensure the permit will not be enlarged and that other water right holders will not be injured. Permit amendments to move the POD downstream are generally not an issue and moving the POD upstream in the case of the Polk County permit appears to be viable because potential injury to other water rights holders and potential for enlargement do not appear to be an issue. Furthermore, there are currently no instream water rights of concern on this section of the Willamette River.

Except for the City of Independence's 2 cfs water right transfer (T-12773), all four of the permits will need to go through a permit extension process, which would then also require preparation of a WMCP update. The requested extension of time for permit development will need to align with the operational goals of each provider. The WMCP will also need to include a water supply plan to request additional water under the permit (greenlight water) for development. **Table 7** summarizes the permit amendments needed for the water right permits of interest.

One issue to point out, is that the 16 cfs (10.3 mgd) that allows for use by the County has a "drop-dead" completion date of 2050, i.e., permit extensions would not be allowed after this year for more extensions. This means that at least 10.3 mgd of the regional supply (intake and WTP) should be built-out and used by then.

Table 6. Regional Supply Capacities for Various Operational Scenarios

Operational Concept	Primary Regional Supply Service	Basis for Regional Supply Capacity Requirement	Regional Supply Requirement
1. Primary Supply for Independence and Monmouth	Transition primary supply to the Willamette River; and use existing supplies for redundancy/emergency	<ul style="list-style-type: none"> 50-year MDD for Independence (6.7 mgd) and Monmouth (5.8 mgd); refer to Table 1 column B 	12.5 mgd
2. Provide supply to meet peaking supply deficiencies due to growth for Independence, Monmouth, and Dallas	Three cities would use the Willamette River to meet their supply deficiencies (to meet peak demands through the 50-year period).	<ul style="list-style-type: none"> 50-year supply deficiencies (to meet MDD) for Independence (3.7 mgd); Monmouth (2.9 mgd); and Dallas (8.2 mgd); refer to Table 1 column E (14.8 mgd) Difference between 50-year MDD and ADD for each city Independence (6.7-3.3=3.4 mgd); Monmouth (5.8-2.3=3.5 mgd); and Dallas (14.2-6.9=7.3 mgd); refer to Table 1 columns C minus B (14.2 mgd) 	14.2 to 14.8 mgd
3. Provide winter/average supply for Independence, Monmouth and Dallas	Three cities would transition to the Willamette River as their primary supply to meet winter/average day demands and use existing supplies for peaking to meet summer/maximum day demands.	<ul style="list-style-type: none"> 50-year ADD for Independence (3.3 mgd); Monmouth (2.3 mgd); and Dallas (6.9 mgd); refer to Table 1 column A 	12.5 mgd

Notes

ADD = average day demand

MDD = maximum day demand

mgd = million gallons per day

Table 7. Permit Amendment for the Regional Supply Water Rights

Water Right	Permit Extension Needed? ¹	Permit Amendment Needed?	Green Light Water Status ²
Polk County Permit S-54681	Yes (C-date year: 2030)	Yes (move POD upstream)	None
Adair Village Permit S-35819	Yes (C-date year: 2050)	Yes (move POD downstream)	None
Independence Permit S-54331	Yes (C-date year: 2026)	Yes (move POD upstream)	None
Independence Transfer T-12773	No (C-date year: 2050)	NA	NA
Monmouth Permit S-54332	Yes (C-date year: 2026)	Yes (move POD upstream)	None

Notes

¹ C-date: Completion date for development of the water right permit.

² Greenlight water: the amount of water approved by Oregon Water Resources Department (based on demonstrated need documented in a Water Management and Conservation Plan for a water provider to divert from a permitted source to meet increasing demands over time.

NA = not applicable

POD = point of diversion

6. Infrastructure and Preliminary Cost Estimates for the Regional Supply Concept

This section presents the infrastructure components of the regional supply concept from Section 5 and preliminary cost estimates to divert, treat, and convey the water to the PCMWPs under various scenarios. Civil West Engineering Services, Inc. (Civil West) provided the conceptual engineering analysis and costs for this section.

6.1 Water Supply Intake and Treatment

The regional supply operational concepts identified in Section 5 all include a Willamette River intake, raw water pipeline, and water treatment plant (WTP) in the vicinity of Independence and Monmouth. The two PODs identified in the water use permit are located near the Buena Vista Region and east of the Rickreall Community Water Association, near West Salem, which are located several miles away from Independence and Monmouth, as shown in **Figure 1**. As noted previously, the main water demand for regional supply will be the cities of Monmouth, Independence, and Dallas. Due to the demand from these systems, it is logistically simpler to place the WTP closer to these areas to limit the amount of large diameter pipe that is required to connect the intake and WTP to these systems.

The focus of the preliminary siting for the intake was at two locations along the stretch of the Willamette River nearest to the two cities (approximately RM 94 to RM97): one on the north side of Independence (RM 95) and the other on the south side of Independence (RM 96.5), as shown in **Figure 1**. The locations were chosen based on their proximity to existing water system infrastructure, their proximity to permitted intake sites on the Willamette River, and topography. Features (pros and cons) for the two locations are listed below:

- Location south of Independence (labeled “New Raw Water Intake” in Figure 1):
 - Pro: adjacent to existing wellfield with water infrastructure; potential acreage for WTP currently owned by the City on Monmouth.
 - Con: No ownership of intake area; no current access to the intake area.

- Location north of Independence (labeled “Alternative Intake and WTP site” in Figure 1):
 - Pro: Likely property available in conjunction with a park; easy access through the park.
 - Con: downstream of wastewater discharge; not adjacent to main water infrastructure; reduces park acreage

Based on the considerations above, the south location was used to develop initial cost estimates associated with a specific site. At this location, the WTP could be tied into the existing distribution systems in both Monmouth and Independence. This location is also near the existing wellfields and planned WTP infrastructure. Constructing a new WTP near these existing facilities inherently shortens the length of conveyance piping to connect to these systems. This does not consider site specific, on-the-ground conditions, which would be part of a more detailed assessment in later phases of this project. Furthermore, the south location is not considered the final selection for intake and WTP.

Based on the regional supply operational concepts described in Section 5, Civil West assumed an in-river intake with a membrane filtration plant both with capacity of 16 mgd. The higher end of the intake and treatment capacity was assumed at this stage of the conceptual analysis to be conservative with costs.

6.2 Conveyance and Water Distribution

The water conveyance concept assumes that the existing water distribution systems for each water provider would be incorporated and interties between the current existing systems would be utilized as much as possible. This will reduce the amount of new pipe required to convey water through the County. However, significant large diameter pipe will still be needed to connect these systems.

Several additional assumptions were made as part of this preliminary analysis:

- The new WTP will be constructed south of Independence relatively near the Willamette River.
- Each water provider presently has the capacity to distribute their 50-year (2072) deficits across their respective service area without additional internal infrastructure.
- Each water provider is willing to allow the use of their infrastructure to distribute water to surrounding water providers.
- Transmission line routes generally follow primary roadways to minimize any potential property or easement acquisition concerns.

The proposed service areas are split into five general service boundaries, separated by total deficit and relative ease of construction, as shown in **Figure 1**:

- Zone 1: Cities of Monmouth and Independence (50-year deficit = ~6.6 mgd)
- Zone 2: City of Dallas (50-year deficit = +~8.2 mgd)
- Zone 3: Luckiamute Domestic Water Cooperative and the City of Falls City (50-year deficit = +~0.3 mgd)
- Zone 4: Perrydale Domestic Water Association and Rickreall Community Water Association (50-year deficit = +~2.2 mgd)
- Zone 5: Buell-Red Prairie Water District, Grand Ronde Community Water Association, and the City of Willamina (50-year deficit = +~0.6 mgd)

Civil West took the general approach of sizing the transmission pipe up to the higher standard pipe diameter that can serve the peak water supply needed to serve each zone. This is to add conservatism to the conceptual design and to add buffer to the system for additional growth in demands.

6.3 Preliminary Planning-level Costs

For purposes of the preliminary cost estimates, the intake and WTP were assumed to have a capacity of 16 mgd. Additional water transmission pipe is then added to serve Dallas and other communities. Costs associated with serving each zone rely on the inclusion of the preceding zone, with the exception that Zones 4 and 5 are not reliant on the inclusion of Zone 3 (refer to **Figure 1**).

Preliminary costs were developed for the following scenarios:

- Scenario 1: Zone 1 only (Independence and Monmouth). Cost includes raw water intake and pump station, raw water piping, WTP, and finished water piping to the cities' existing infrastructure.
 - Zone 1a: A possible "sub-scenario" would be to connect only to Luckiamute in the area immediately south of Independence/Monmouth. This would require much less conveyance costs but would not include service to Falls City. More information on the distribution system for Luckiamute is needed to define this sub-scenario and associated costs.
- Scenario 2: Zones 1 and 2 only (Independence, Monmouth, and Dallas). Cost includes all Scenario 1 costs, plus finished water piping to the City of Dallas (includes pressure booster station).
- Scenario 3: Zones 1 – 3. Cost includes all Scenario 1 and 2 costs, plus finished water pipe to, and through, Luckiamute Domestic Water Cooperative and to City of Falls City (includes pressure booster station).
- Scenario 4: Zones 1, 2, & 4. Cost includes all Scenario 1 and 2 costs, plus finished water pipe to, and through Rickreall Community Water Association and to Perrydale Domestic Water Association.
- Scenario 5: Zones 1, 2, 4, & 5. Cost includes all Scenario 4 costs, plus finished water pipe (and two booster stations) to the systems included in Zone 5 (Buell-Red Prairie Water District, Grand Ronde Community Water Association, and Willamina).

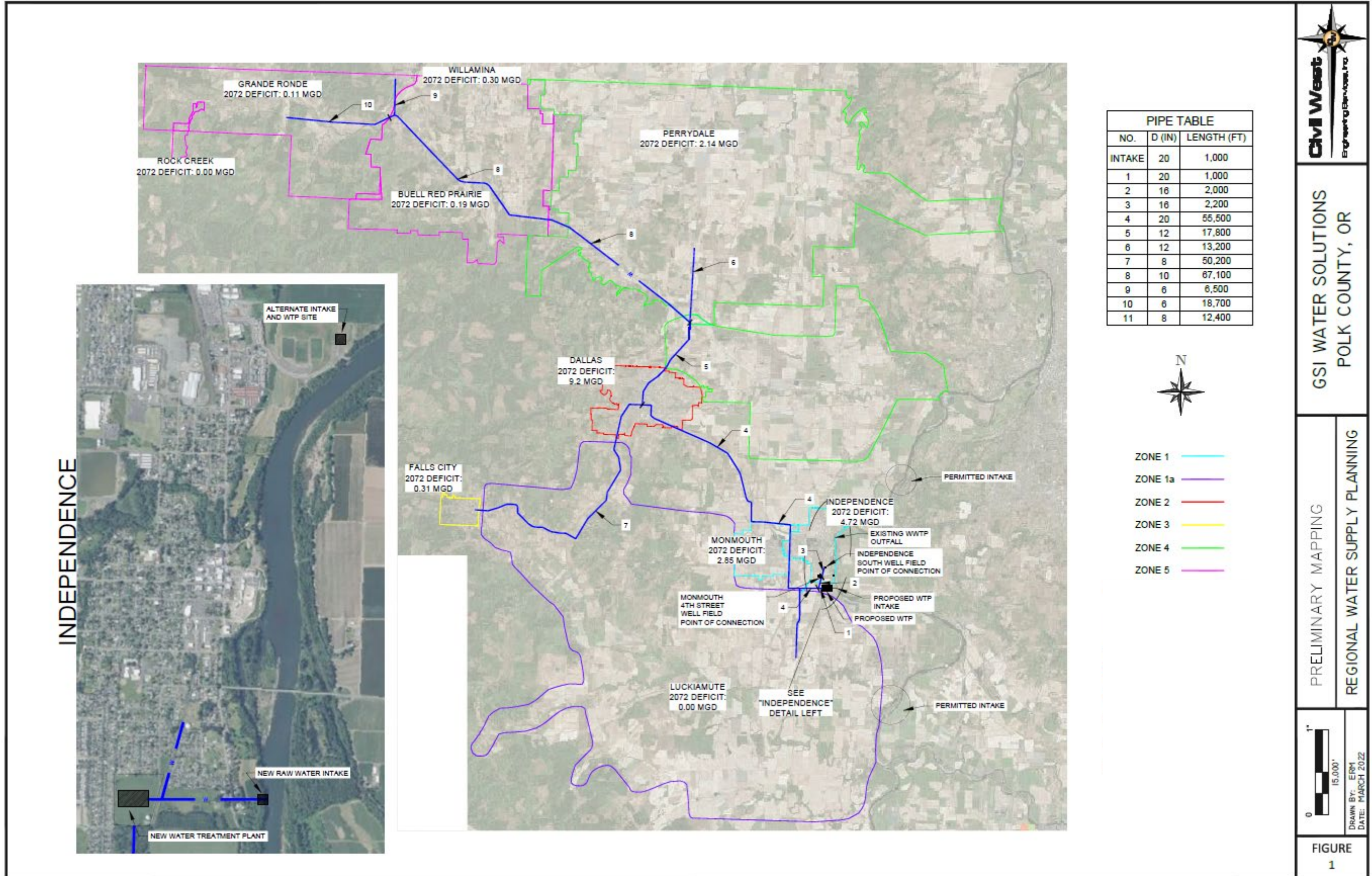
General assumptions used to develop the preliminary engineering construction cost estimates include:

- Construction contingency 35% of construction labor and materials cost estimate
- Engineering, legal and administration: 25% of construction subtotal cost estimate
- Construction management: 8% of construction subtotal cost estimate

Attachment 2 includes the detailed cost estimate tables and assumptions for the scenarios above. **Table 8** summarizes the incremental infrastructure components and costs of the regional supply to serve the zones and corresponding water providers. It should be noted that intake and WTP capacities are based on a 16 mgd capacity, and the transmission line costs are based on the diameters and lengths shown in **Figure 1**.

The cost of \$84 million to serve Zone 1 (Independence and Monmouth) is considered the "baseline" cost for the regional supply concept. An additional transmission cost of \$42 million is needed to deliver water to Dallas.

Figure 1. Preliminary Polk County Regional Supply Infrastructure Concept Components (prepared by Civil West)



GS WATER SOLUTIONS
POLK COUNTY, OR

PRELIMINARY MAPPING
REGIONAL WATER SUPPLY PLANNING

0 1" 15,000'
DRAWN BY: ERM
DATE: MARCH 2022

FIGURE
1

Table 8. Summary of Preliminary Cost Estimates for Regional Supply to Serve Polk County Municipal Water Providers

Scenario	Additional Water Providers Served (from Zone 1)	Incremental Infrastructure (from Zone 1)	Incremental Cost to Serve (\$M) (from Zone 1)	Approximate Total Cost (\$M)
Zone 1	City of Independence City of Monmouth	Intake and WTP (16 mgd) Segment 1 (20-inch; 1,000 ft) Segment 2 (16-inch, 2,000 ft) Segment 3 (16-inch, 2,200 ft)	\$84M	\$84M
Zones 1 and 2	City of Dallas	Segment 4 (20-inch, 55,500 ft) One pump station	\$42M	\$126M
Zones 1 through 3	City of Dallas Luckiamute City of Falls City	Segment 4 (20-inch, 55,500 ft) Segment 7 (8-inch, 50,200 ft) Two pump stations	\$58M	\$142M
Zones 1, 2, and 4	City of Dallas Rickreall Perrydale	Segment 4 (20-inch, 55,500 ft) Segment 5 (12-inch, 17,800 ft) Segment 6 (12-inch, 13,200 ft) Two pump stations	\$58M	\$142M
Zones 1, 2, 4, and 5	City of Dallas Rickreall Perrydale Buell-Red Grand Ronde City of Willamina	Segment 4 (20-inch, 55,500 ft) Segment 5 (12-inch, 17,800 ft) Segment 6 (12-inch, 13,200 ft) Segment 8 (10-inch, 67,100 ft) Segment 9 (6-inch, 6,500 ft) Segment 10 (6-inch, 18,700 ft) Three pump stations	\$89M	\$173M

Notes

- Buell-Red = Buell-Red Prairie Water District
- ft = foot or feet
- Grand Ronde = Grand Ronde Community Water Association
- Luckiamute = Luckiamute Domestic Water Cooperative
- M = million
- mgd = million gallons per day
- Perrydale = Perrydale Domestic Water Association
- Rickreall = Rickreall Community Water Association
- WTP = water treatment plant

7. Conclusion

The conditions on use of the Polk County water right limit its ability to meet spring or summer water demands for PCMWP. The Willamette River water use permits held by Adair Village, Independence, and Monmouth provide additional reliability to meet long-term supply objectives. Considering all these permits and the possible flow target conditions during low flow years, 16 mgd is a reasonable reliable capacity for a Polk County regional supply that addresses supply objectives to augment existing supplies, replace existing supplies with added reliability of the Willamette River, or provide supply redundancy to existing supplies.

Preliminary estimate of “baseline” cost for intake, WTP, and water transmission to serve Independence and Monmouth is \$84 million. Additional transmission pipeline to convey water to Dallas will add another \$42 million, and conveyance costs to serve the other PCMWP could add another \$58 to \$89 million depending on which water providers are included.

While these costs may seem significant, a regional supply from the Willamette River provides long-term reliability and resiliency. It is the largest watershed in Oregon with surface water available for supply development and provides overall resiliency against climate change uncertainties on existing supplies. A regional supply also provides opportunities for cost-sharing where federal and state funding seeks to maximize regional, shared benefits.

The information in this tech memo was presented in a May 13, 2022 workshop to representatives from Polk County and the cities of Monmouth and Dallas. Representatives from Independence were not able to attend. The following summarizes key feedback provided by participants in the workshop:

- Cities of Monmouth and Dallas are interested in continuing to participate in the study, recognizing the value that the Willamette River supply (and the potential regional approach) provides to improving supply resiliency.
- Regardless of how the regional approach moves forward, each community will need to continue their individual water supply planning efforts.
 - Dallas noted that their priority will continue to be pursuing their storage project. Interest in a regional Willamette supply is more likely as a redundant supply
 - All recognize the value to water system inerties regardless of the supply development.
- Developing and maintaining a collaborative “partnership” among the cities will be critical to moving a regional supply forward.
- Due to the costs of developing water supply, a regional approach can provide advantages in securing funding. Participants were interested in additional information on funding opportunities.
- Polk County highlighted that its water use permit has a completion date of 2030, and that a regional approach can be critical to developing the permit. Alternatively, not moving forward with a regional supply could result in forfeit of the permit.

Based on the feedback and the next steps in the project scope of work, the consultant team will be coordinating follow-up communications and engagement with all of the PCMWP to refine the infrastructure plan and regional concept.

8. References

GSI. 2021. *Polk County State of Water Supply Needs Technical Memorandum-Final*. Prepared for Polk County Community Development. Prepared by GSI Water Solutions, Inc. (GSI). August 9, 2022.

HDR-EES. 2005. *Polk County Regional Water Supply Strategy*. Prepare for Polk County Water Providers.

Jacobs. 2018. *City of Dallas Water Supply Study*. Prepared for City of Dallas, Oregon. August.

4B Engineering. 2020. *City of Monmouth Water Master Plan*.

Attachment 1

Preliminary Cost Estimate Tables

The following preliminary cost estimates were prepared by Civil West.

Study Zones						
Water Provider	2072 Deficit (MGD)	Zone Number				
		1	2	3	4	5
City of Dallas	9.20		X			
City of Falls City	0.31			X		
City of Independence	4.72	X				
City of Monmouth	2.85	X				
City of Willamina	0.30					X
Buell Red Prairie Water District	0.19					X
Grand Ronde Water District	0.11					X
Luckiamute Domestic Water Cooperative	0.00			X		
Perrydale Water District	2.14				X	
Rickreall Water District	0.02				X	
Rock Creek Water District	0.00					X
Total Deficit 2072	19.84	7.57	9.2	0.31	2.16	0.6
Percent of Total Deficit	100%	38%	46%	2%	11%	3%

Scenario 1				
Zone 1				
Description	Unit	Quantity	Unit Price	Extended Price
16 MGD Water Treatment Plant	LS	1	\$ 37,500,000	\$ 37,500,000
Raw Water Intake Pipe and Structure	LS	1	\$ 7,500,000	\$ 7,500,000
16" Diameter Pipe	LF	4,200	\$ 350	\$ 1,470,000
20" Diameter Pipe	LF	1,000	\$ 400	\$ 400,000
9.2 MGD Pump Station	LS	0	\$ 1,000,000	\$ -
Labor and Materials Subtotal				\$46,870,000
Contingency (35%)				\$16,404,500
Construction Subtotal				\$63,274,500
Administration and Legal (5%)				\$3,163,725
Engineering Design (20%)				\$12,654,900
Construction Management (8%)				\$5,061,960
Estimated Total Cost				\$84,160,000

Scenario 2				
Zones 1 & 2				
Description	Unit	Quantity	Unit Price	Extended Price
16 MGD Water Treatment Plant	LS	1	\$ 37,500,000	\$ 37,500,000
Raw Water Intake Pipe and Structure	LS	1	\$ 7,500,000	\$ 7,500,000
16" Diameter Pipe	LF	4,200	\$ 350	\$ 1,470,000
20" Diameter Pipe	LF	56,500	\$ 400	\$ 22,600,000
9.2 MGD Pump Station	LS	1	\$ 1,000,000	\$ 1,000,000
Labor and Materials Subtotal				\$70,070,000
Contingency (35%)				\$24,524,500
Construction Subtotal				\$94,594,500
Administration and Legal (5%)				\$4,729,725
Engineering Design (20%)				\$18,918,900
Construction Management (8%)				\$7,567,560
Estimated Total Cost				\$125,810,000

Scenario 3				
Zones 1, 2, & 3				
Description	Unit	Quantity	Unit Price	Extended Price
16 MGD Water Treatment Plant	LS	1	\$ 37,500,000	\$ 37,500,000
Raw Water Intake Pipe and Structure	LS	1	\$ 7,500,000	\$ 7,500,000
14.3 MGD Water Treatment Plant	LS	0	\$ 30,000,000	\$ -
8" Diameter Pipe	LF	50,200	\$ 160	\$ 8,032,000
16" Diameter Pipe	LF	4,200	\$ 350	\$ 1,470,000
20" Diameter Pipe	LF	56,500	\$ 400	\$ 22,600,000
9.51 MGD Pump Station	LS	1	\$ 1,000,000	\$ 1,000,000
0.31 MGD Pump Station	LS	1	\$ 1,000,000	\$ 1,000,000
Labor and Materials Subtotal				\$79,102,000
Contingency (35%)				\$27,685,700
Construction Subtotal				\$106,787,700
Administration and Legal (5%)				\$5,339,385
Engineering Design (20%)				\$21,357,540
Construction Management (8%)				\$8,543,016
Estimated Total Cost				\$142,030,000

Scenario 4				
Zones 1, 2, & 4				
Description	Unit	Quantity	Unit Price	Extended Price
16 MGD Water Treatment Plant	LS	1	\$ 37,500,000	\$ 37,500,000
Raw Water Intake Pipe and Structure	LS	1	\$ 7,500,000	\$ 7,500,000
12" Diameter Pipe	LF	31,000	\$ 250	\$ 7,750,000
16" Diameter Pipe	LF	4,200	\$ 350	\$ 1,470,000
20" Diameter Pipe	LF	56,500	\$ 400	\$ 22,600,000
11.34 MGD Pump Station	LS	1	\$ 1,000,000	\$ 1,000,000
2.14 MGD Pump Station	LS	1	\$ 1,000,000	\$ 1,000,000
Labor and Materials Subtotal				\$78,820,000
Contingency (35%)				\$27,587,000
Construction Subtotal				\$106,407,000
Administration and Legal (5%)				\$5,320,350
Engineering Design (20%)				\$21,281,400
Construction Management (8%)				\$8,512,560
Estimated Total Cost				\$141,520,000

Scenario 5				
Zones 1, 2, 4, & 5				
Description	Unit	Quantity	Unit Price	Extended Price
16 MGD Water Treatment Plant	LS	1	\$ 37,500,000	\$ 37,500,000
Raw Water Intake Pipe and Structure	LS	1	\$ 7,500,000	\$ 7,500,000
8" Diameter Pipe	LF	-	\$ 160	\$ -
10" Diameter Pipe	LF	67,100	\$ 200	\$ 13,420,000
12" Diameter Pipe	LF	31,000	\$ 250	\$ 7,750,000
16" Diameter Pipe	LF	4,200	\$ 350	\$ 1,470,000
20" Diameter Pipe	LF	56,500	\$ 400	\$ 22,600,000
11.94 MGD Pump Station	LS	1	\$ 1,000,000	\$ 1,000,000
2.74 MGD Pump Station	LS	1	\$ 1,000,000	\$ 1,000,000
0.60 MGD Pump Station	LS	1	\$ 1,000,000	\$ 1,000,000
Labor and Materials Subtotal				\$96,264,000
Contingency (35%)				\$33,692,400
Construction Subtotal				\$129,956,400
Administration and Legal (5%)				\$6,497,820
Engineering Design (20%)				\$25,991,280
Construction Management (8%)				\$10,396,512
Estimated Total Cost				\$172,840,000