CITY OF PAISLEY WATER SYSTEM MASTER PLAN

PREPARED FOR:

CITY OF PAISLEY

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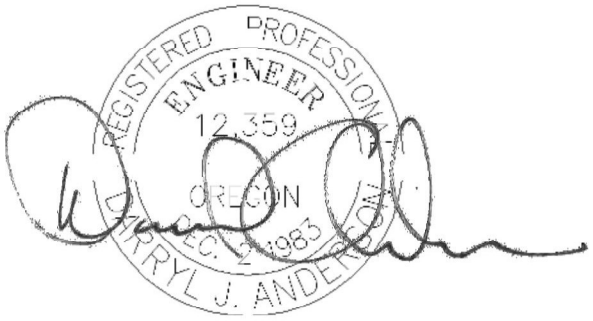

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City of Paisley Water System Master Plan

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1.0 Summary

Local governments, in conjunction with the Oregon Department of Human Resources – Health Division, have long recognized the need for water planning within populated areas. The City of Paisley provides water for approximately 260 people living within an area of approximately 0.5 square miles. The goal of the City is to provide quality drinking water to those living within Paisley. With an assumed growth rate of 0.2% for the next 20 years, the City could have the capability to satisfactorily service the entire area. However, aged and failing water lines, lack of backup power to well pumps, and decreasing static water levels for two supply wells will prevent this goal from being accomplished unless significant financial investments into the system infrastructure and new equipment is secured.

The purpose of the Paisley Water System Master Plan is to provide the community with an outline of how water should be managed to meet the needs of its citizens into the future. The Oregon Department of Human Services specifically requires the following items to be contained in the plan:

1) A summary of the overall plan.
2) A description of the existing system, including water usage patterns, water quality, and regulatory compliance issues, if any.
3) An estimate of projected growth, future water needs, system deficiencies, and remedies for addressing those deficiencies.
4) An evaluation for financing options
5) A recommended program of improvements, including associated costs and a proposed schedule for construction projects.

Although the City of Paisley currently has fewer than 300 connections, it was approved by state funding agencies for an updated Master Plan for their municipal water services. The primary planning horizon for this plan covers 2021-2041. The Master Plan evaluates the existing water system and provides a guide for repairs and system maintenance.

The City wishes to supply high quality water to the residents of Paisley while maintaining adequate supply and storage capacity. The City has developed four goals for the water system, considering existing and future regulatory requirements, non-regulatory water quality needs, flow and pressure requirements, and capacity needs related to fire flow.

- Goal #1 – Provide customers with safe, quality water.
- Goal #2 – Provide adequate water supply to meet current and future needs.
- Goal #3 – Provide adequate water storage.
- Goal #4 – Provide a quality collection and distribution system.

The existing water system is not capable of meeting all the service goals and has the following deficiencies:

- Aging asbestos concrete piping throughout most of the distribution system.
- Aging fire hydrants and valves.
- Vaults that are leaking and need repairs.
- Inadequate backup power at wells.
- Water quality and supply issues.

The City of Paisley's water system needs can be prioritized as follows:

1. Drill a new well that draws water from a different aquifer and location to avoid both the potential contamination of arsenic and the risk of being in the same zone of inclusion as the existing wells.
2. Provide backup power at one of the existing wells.
3. Upgrade the distribution system by replacing the aging asbestos concrete piping, aging valves and fire hydrants, and repairing leaking vaults.

The recommended alternative to achieve the goals and correct the deficiencies is to complete all three priorities in a single project. A new well will allow the City to fully utilize their available water rights and help maintain adequate water supply for the system. A backup generator at one of the existing wells is very important to maintain system operation in the event of a prolonged power outage. Completing the upgrades to the distribution system at the same time is more efficient and will mitigate the risk of asbestos contamination.

Total capital costs are estimated at $3,319,262. The recommended financing options are loan financing through either Business Oregon or USDA Rural Development. It is recommended that the City explore grant funding opportunities to allow the entire project to be completed at once.

The City can choose to use a phased approach to completing the upgrades, focusing on Priorities #1 and #2 first and completing priority #3 when funding is available. The estimated cost to complete priorities #1 and #2 is $984,250 and the cost to complete priority #3 is $2,400,012.

2.0 Existing Water System

2.1 Service Area

The City of Paisley is located in south-central Oregon, accessible through Highway 31 (see Fig. 1). Paisley's water system was originally constructed in 1972, consisting of one well and a storage tank. Distribution lines and lateral connections are asbestos concrete, with meters being placed in concrete boxes. At the time, the City of Paisley was growing in population and there were not enough private wells to service all businesses and residences. In some instances, there were up to five homes plumbed into a single private well. As Paisley grew, a 6-inch iron line was added to bring industrial-use waters to the sawmill. The sawmill is not currently operating, and the line is owned by the mill, not the City of Paisley. Two additional wells were added in 1975 and 1995, respectively, to allow for the City of Paisley to have the necessary water volumes required to sustain its needs. Future services added were generally done with PVC, as well as one major repair to the distribution system over the years.

Two of the wells are located in close proximity to each other and subsequently sourced from the same aquifer. From the wells, water is pumped to the west into a storage tank, the level of which is visually maintained. The storage tank is located on the flank of the Fremont National Forest. All municipal-use waters follow a series of distribution pipes through roadways and alley rights-of-way to service the entirety of Paisley. There are a few service lines outside of Paisley proper that have been placed over the years due to business or residential requests. A map showing the service area is included in the Appendix.

Figure 1: Google Earth image of Paisley

Equivalent Dwelling Unit (EDU)

An Equivalent Dwelling Unit, or EDU, is the average water flow received by one single family residential housing unit. EDU are the basis for computing system development charges (SDC), if any, and water user rates. They are also useful for planning purposes since EDU give an indication of the impacts of nonresidential development. Different funding agencies compute EDU differently, based on the gallons of water provided. Business Oregon – Infrastructure Finance Authority (IFA) requires a water flow of 7,500 gallons per month, whereas United States Department of Agriculture Rural Development (USDA-RD) is based on actual usage and recommends a design flow rate of 150 gallons per day per capita. Assuming 2.5 capita per household this equates to 11,250 gallons per month, a 50% difference from the 7,500-gallon criteria. In general, water use is higher in rural areas.

Table 1 summarizes the current EDU that are within the system's service area boundary from data derived from Paisley. This includes areas within the City limits as well as areas outside the City limits and utilizes data from highest-use water month of the year.

Type of User	# of Connections	Usage (gallons/day)	EDU Business OR	EDU USDA-RD
Residential	**129**	**58,137**	**236**	**154**
Commercial/Industrial	**5**	**2,297**	**9**	**6**
Totals	**134**	**60,434**	**245**	**160**

Table 1: Current EDU Summary Table

Current User Rates

Currently, the City has 129 residential accounts and 5 commercial accounts. The City charges each customer a minimum monthly rate based on their service size and has a tiered system for pricing, based on volume used. The current user rates are shown in Table 2.

Type of User	Base Water Usage (gallons)	Base Rate	Overage Rate (4,460-49,900 gal)	Overage Rate (over 50,000 gal)	Overage Rate (over 100,100 gal)
¾" Pipe	4,500	$25.00	$0.50/ 1,000 gal	$0.60/ 1,000 gal	n/a
1" Pipe	4,500	$25.50	$0.50/1,000 gal	$0.60/1,000 gal	n/a
1-1/2" Pipe	4,500	$26.50	$0.50/1,000 gal	$0.60/1,000 gal	n/a
2" Pipe	4,500	$32.50	$0.50/1,000 gal	$0.60/1,000 gal	n/a
6"	100,000	$75.00	n/a	n/a	$0.60/1,000 gal
Schools	100,000	$75.00	n/a	n/a	$0.60/1,000 gal
Trailer Parks/Motels	100,000	$75.00	n/a	n/a	$0.60/1,000 gal
Standby Fire Service		$20.00			
Industrial	By negotiation with City Council on an individual basis				

Table 2: Current User Rates

2.2 Existing Land Use and Zoning

Paisley consists of three zones delineated via color sections and codes, as seen in Figure 2. Residential zones consist of single or multi-family homes where water usage is solely for personal and domestic purposes. Paisley also has a Commercial Zone, where all business resources for the City can be found. These zones have water usage needs consistent with business operations, with the highest water use being in industrial zones, specifically for irrigation purposes. The most expansive zone within Paisley is the Rural Community zone, which is a mix of ranches, smaller farms, and private residences. Each zone has unique needs for municipal waters ranging from domestic use (residential) to cooling materials (industrial). The majority of the developed areas of Paisley are found within the City limits. There is some room for growth within the City limits, but the largest growth potential is undeveloped land currently zoned as Rural Community.

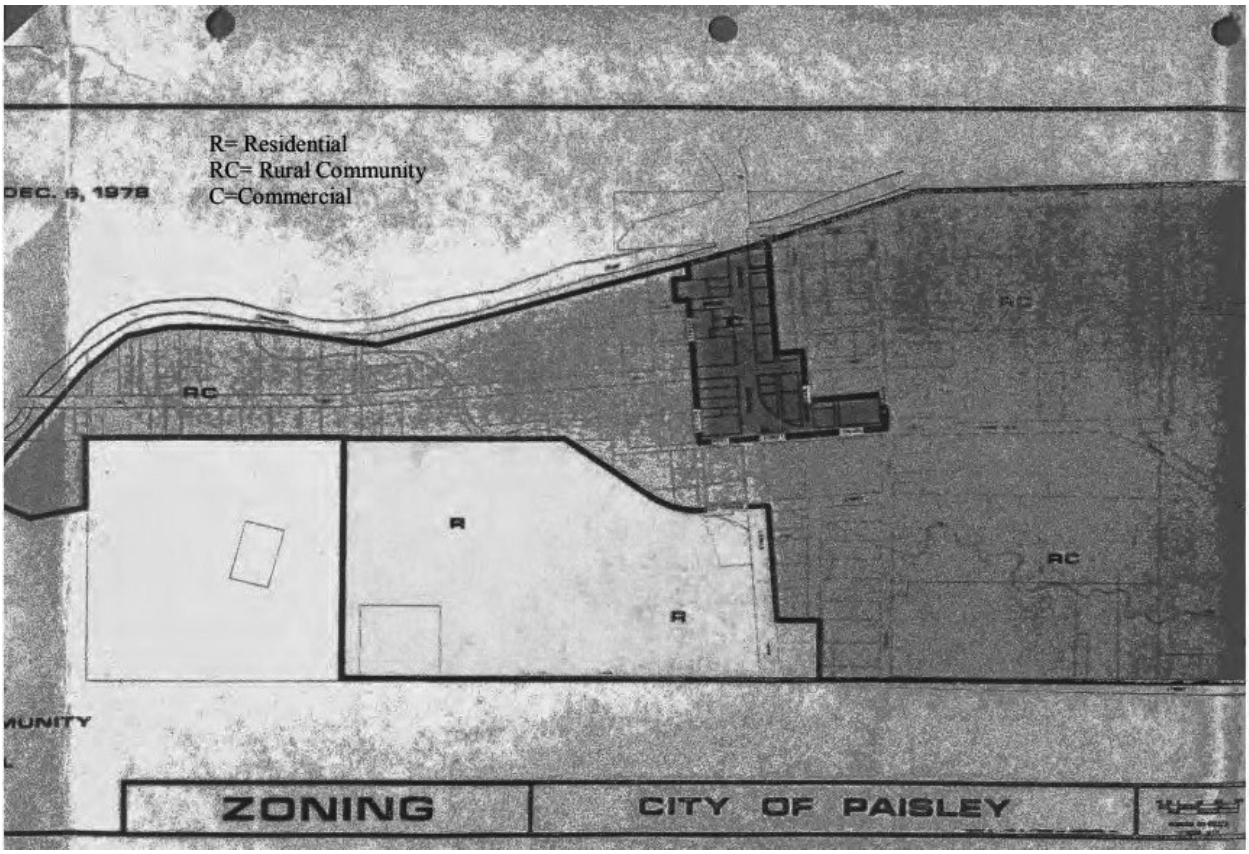

Figure 2: Zoning Map of Paisley

2.3 Source of Supply

All municipal waters for Paisley are supplied by three wells located off Main Street, behind the Catholic Church (see Fig. 3). However, Wells #2 and #3 are within 30 feet of each other. This close spatial proximity means these wells cannot be used at the same time. Using both wells simultaneously drains the cone of influence, creating a situation where neither well is producing the water rates that it should, thus putting extra stress on the well pumps. It has also been noted by the system operator that the static water level within these two wells has been dropping over the last 20 years. This may mean that the aquifer is not being recharged at a rate comparable to the usage. This may create an issue for water availability in the future.

Additional review of existing well construction and depths should be completed. The relatively shallow depths of the existing wells may not have a large enough margin for drought conditions.

Description	Latitude (North)	Longitude (West)
Well #1	42°41' 24.87"	120°32' 40.73"
Well #2	42°41' 26.78"	120°32' 40.65"
Well #3	43°41' 27.06"	120°32' 40.64"

Figure 3: Google Earth image showing the locations within Paisley for all municipal wells

All wells are tapped into various aquifers within the Chewaucan River Basin, with Wells #2 and #3 tapped into the same aquifer. The Chewaucan River Basin consists of interbedded alluvial deposits, ranging between clays, sands, cobbles, and any intercalated variation thereof. Within these lithologically distinct beds, various aquifers with a variety of water chemistries exist.

The details of each well are as follows:

Well #1

Drilled in 1969 to a depth of 216 feet. A 15-inch hole was drilled to 21 feet and a six-inch hole continues to 216 feet. Groundwater was first encountered at approximately 33 feet and this was reported as the static water level. Six-inch casing was installed from the surface to a depth of 190 feet. The casing was perforated from 60 feet to 190 feet. Cement was placed in the annular space between the casing and the hole wall to a depth of 21 feet to serve as a casing seal. The well has a turbine pump set at 80 feet, with a pumping rate of 95 gallons per minute (GPM) (see Fig. 4).

Figure 4: Image of the well pump for Well #1.

Well #2

Drilled in 1974 to a depth of 205 feet. A 24-inch hole was drilled to 40 feet with a 15-inch diameter hole drilled to total depth of 205 feet. A production-level quality of groundwater was first reported in a gravel layer at 67 feet with a static water level of 38 feet. Eight-inch casing was installed from the surface to the extent of the well. The casing was perforated from 80 feet to 180 feet. Cement and bentonite were placed in the annular space from the surface to 40 feet to serve as a casing seal. A 15-horsepower submersible pump is set at 85 feet with a pumping rate of 110 GPM. (see Fig. 5).

Figure 5: Image of the well pump for Well #2.

Well #3

Drilled in 1995 to a depth of 124 feet. A 15-inch hole was drilled to 23 feet, with an 8 5/8" hole continued to 124 feet. Groundwater was first reported at a depth of 30 feet with a static water level of 11 feet. Subsequent water-bearing zones were encountered at 43-58 feet, 70-89 feet, and 97-124 feet. Static water levels for the latter three water-bearing zones varied from 50 feet to 53 feet below ground level. Eight-inch casing was installed from one foot above the surface to 124 feet. The casing was perforated from 83 feet to 121 feet. Cement was placed in the annular space to a depth of 23 feet to serve as the casing seal. A 15-horsepower submersible pump was placed at 85 feet with a pumping rate of 110 GPM (see Fig. 6).

Figure 6: Image of the well pump for Well #3.

Looking at the water quality and close spatial association of Wells #2 and #3, an arsenic contaminated aquifer must exist between 83 feet to 121 feet.

2.4 System Water Use

Municipal waters are broken down into three classes of water use: 1) Domestic; 2) Commercial and Industrial; 3) Public. Domestic use waters are those used in private residences for drinking, bathing, lawn maintenance, and sanitary purposes. Commercial and industrial waters are waters used by commercial establishments and industrial operations to facility those operations. In general, commercial uses are much smaller than industrial uses. Public uses are those required for parks, civic buildings, schools, hospitals, churches, street washing, and fire protection. Usage amounts are highly variable based on the preferences of the individual and the type of hardware they have in their homes (for example, does this residence have low flow toilets installed?). Commercial, industrial, and public water use also vary tremendously based on the specific operations (for example, a restaurant is going to use a lot more water than a dry goods store).

The City of Paisley has 134 connections within the service area boundary. There are a number of commercial use businesses, with the majority of Paisley's water services being utilized for

residential purposes. Paisley does not currently have any industrial users. The annual water usage was 22,058,400 gallons for 2019. Water demands are highest during the summer months.

Customer Category	# of Connections	Actual Demand (gallons/day)	Maximum Demand (gallons/day)	Actual Annual Demand (gallons)
Residential	**129**	**58,137**	**130,351**	**21,220,181**
Commercial/ Industrial	**5**	**2,297**	**5,149**	**838,219**
Total	**134**	**60,434**	**135,500**	**22,058,400**

Table 3: Current Water Usage

2.5 System Operation and Maintenance

Paisley's municipal water services consist of three wells and a 200,000-gallon storage tank. Water mainline are all six-inch asbestos concrete. There is one section of six-inch iron pipe considered privately owned and not included in any improvements within this plan, and two small portions of the system that have been replaced in the past with PVC pipe. Large services are either asbestos concrete or PVC four-inch lines depending on time of installation. There is a valve on almost every intersection throughout Paisley, so isolating portions of the system for maintenance and replacement as needed should not be an issue. However, it has been noted by the operator that many valves will not function correctly and there are a few valves marked on the system plans that are not installed. The storage tank is located on the flank of a mountain so no booster pump is needed to ensure that the entirety of Paisley has municipal waters at sufficient pressures.

The operation of the system is as followed:

Well pumps are turned on, as needed, when the water of the storage tank is less than 75%, noted via a staff gauge (see Fig. 7). Waters are pumped into a storage tank to the west. Waters then flow to all parts of the system with sufficient pressure via head pressure from the storage tank.

Figure 7: Image of the storage tank and water level staff gauge.

Portions of the system have been failing and when that occurs, the system operator replaces that section of mainline with PVC pipe. However, it is extremely difficult to locate leaks within the system due to porous soil and cobbles in lower soils. There are currently multiple leaks from unknown locations. Valves and hydrants are failing as well and need to be replaced. Meters, in general, are working well and are replaced if broken or damaged.

Maintenance for the Paisley water system is the responsibility of the City of Paisley's water and sewer operator. It is the operator's responsibility to ensure that there are always sufficient stored waters to meet the needs of Paisley's residents and businesses, and to have enough water at all times for emergency purposes, such as fires. The operator reads meters on a monthly basis and can track actual customer usage for comparison with amounts pumped from the wells. According to interviews with current and previous system operators, very little general maintenance is required on the system. System failures are becoming more frequent and are generally caused by either human error or aged materials that have not been replaced since their original installation in 1972.

2.6 Water Rights

The Ground Water act of 1955 declared that "…all water within the State…belongs to the public," and such water could "be appropriated for beneficial use…". The present statues define 'water of the State' as any surface or groundwater located within or without this State

and over which this State has sole or concurrent jurisdiction. The statues further declare that all water within the State from all sources of water supply belong to the public.

A permit is required to appropriate waters, whether surface or groundwater. Permits are granted by the State for appropriation of groundwater under various conditions including noninterference with existing rights to appropriate surface water. In considering whether the proposed use would impair or be detrimental to the public interest, the State of Oregon must consider a number of criteria. These include promoting conservation of water use for all purposes, the maximum economic development of water involved, the amount of water available for appropriation, and all vested rights to the water of the State.

Some areas of the State have been declared Critical Groundwater Areas. Such areas include those where groundwater is declining or has declined excessively, where there is a pattern of interference between groundwater users, and where there is a pattern of interference between wells and surface water users. The statue defines interference as the spreading of the cone of depression of a well to intersect a surface water body or the reduction of the groundwater gradient and flow as a result of pumping, which contributes to a reduction in surface water availability. Thus, Oregon statues and administrative rules clearly and explicitly protect the rights of senior water holders.

The City of Paisley has municipal water rights for groundwater. These rights are listed below:

Location	Permit #	Certificate #	Priority	Diversion Rate (cfs*)
Well #1	G4721	41327	9/22/1969	0.28 cfs
Well #2	G6579	48032	10/3/1975	0.29 cfs
Well #3	G12876		8/4/1995	0.267 cfs
			Total:	0.837 cfs
		Total:	395.67 gpm	542,900 gpd

*cfs = cubic feet per second

Table 4: City of Paisley Water Rights

All water rights are combined for a total of 542,900 gallons per day (GPD). The City has sufficient rights to meet current and projected future supply demand. The City needs to ensure that all existing water rights from all sources are being used, even if it is a very minor amount, in order to keep the rights current and not be subject to any cancelations from non-use.

As can be seen in Table 4, Permit G12876 does not have a certificate issued. The claim of beneficial use was submitted to Oregon Water Resources (OWRD) on March 5, 2005. A letter from OWRD was sent to the City in November of 2008 rejecting the pump test that was submitted with the claim. The pump test had been completed by a well driller and did not meet the requirements. A new pump test was not submitted at that time and the claim has not been finalized. The City needs to submit an extension of time to finalize the pump test and provide an updated Water Management and Conservation Plan (WMCP). An updated WMCP is included in Section 9.0 of this plan and the City should complete a new pump test as soon as possible.

Copies of water right certificates and permit documents are included in the Appendix.

2.7 Drinking Water Quality and Compliance with Regulatory Standards

In order to provide a healthy water supply for the Paisley community, it is recommended that all drinking water shall meet or exceed the requirements for the Safe Drinking Water Act. The Safe Drinking Water Act was enacted in 1974, when the United States Congress authorized the federal government to establish national drinking water standards. These standards set the maximum permissible levels of contaminants found in drinking water. The U.S. Environmental Protection Agency (EPA) believes all waters are at risk, to varying degrees, to contamination by viruses and pathogenic bacteria. Therefore, all public water systems are required to ensure protection from illness caused by potential contaminants. Additionally, the EPA provides primary and secondary standards for inorganic contaminants which clearly define acceptable (safe) volumetric levels for potentially hazardous inorganic chemicals and other pollutants found within drinking water. Primary water quality standards include those chemicals and pollutants that are categorically unsafe to drink and enforceable by law. Secondary standards are recommended and thus not enforceable by law. See Exhibit 4 in the Appendix for a complete list of the EPA's water quality standards.

The Lead and Copper Rule Revision includes proposed changes to the lead and copper standards for public water systems. These changes include revised action level and trigger level of lead and copper as well as revised sampling and collection procedures. The City has not had any major issues with lead or copper levels and does not have any lead lined piping. Lead levels above zero have occasionally been detected but have usually been below action levels. The proposed rule changes may require the City to perform additional monitoring or testing if lead levels are detected in the future, but are not expected to significantly impact the City's water quality program.

In general, the quality of water from the wells is of good quality. The City has had issues with arsenic contamination in the past. The current safe level for arsenic in drinking water is 0.01

mg/L or less, prior to 2018 it was 0.05 mg/L. When the EPA lowered the maximum allowable contamination level, Paisley was no longer in compliance with arsenic standards, testing at 0.012 and 0.013 mg/L. Due to increased arsenic levels, the Oregon Health Authority placed the City of Paisley under Administrative Order to reduce the arsenic levels in the municipal use water below the legal limit. An arsenic treatment plant was constructed at Well #1 (see Fig. 8). All water from Wells #2 and #3 flow through the arsenic treatment facility at Well #1 prior to entering the distribution system. The City adds ferric chloride and sodium hypochlorite to all municipal use water prior to entering the distribution system in order to remove arsenic from the water. The ferric chloride and sodium hypochlorite combine to form ions of iron, which in turn reacts with the arsenic, binding it into a molecule. This molecule is easily removed through a filtration system that withdraws the iron molecule and the arsenic along with it from the water. Upon completion of the arsenic treatment facility, the Oregon Health Authority agreed to monthly testing, as opposed to quarterly, to ensure compliance with water quality standards for safe drinking. As of the final quarter of 2018, the Administrative Order for arsenic was dropped and testing has returned to normal quarterly intervals.

The arsenic treatment system is functioning properly and the City is in compliance with arsenic levels. However, it is recommended the City review the treatment system to ensure it has the capacity to accommodate the flow volumes if the City utilizes their water rights fully.

Figure 8: Image of arsenic treatment apparatus at Well #1.

There are no other issues in terms of water quality standards for the City of Paisley. All municipal-use waters are chlorinated to ensure no potential bacterial contamination (see Fig. 9). Lead, copper, nitrates, volatile and synthetic organic compounds, and all coliform bacteria levels are consistently below the EPA's limits set for potable water.

Figure 9: Image of chlorine injection system at Well #1.

For the most up-to-date information on the water quality of Paisley, please visit the website: https://yourwater.oregon.gov/. Within this website, use ID # 00611 to find all reports on water quality and water quality testing compliance for the City of Paisley.

2.8 Distribution System

Paisley's distribution system consists of four miles of asbestos concrete installed in 1972, approximately 0.5 miles of iron pipe put in place when there was an operational mill, and 20 feet of PVC that has been installed during a prior system failure near the school. The distribution system includes shut off valves at every street intersection, allowing for quick isolation of portions of the system for repair and maintenance. There are a total of 24 fire hydrants and 71 valves within the system. The Operator has noted that many valves do not work correctly, making repairs more difficult and negatively impacting larger portions of the system as a functioning valve must be located to complete repairs. There are also hydrants located at nearly every intersection for firefighting purposes but a few of those hydrants are leaking or not working properly. The distribution system pressure is solely based off head pressure from the storage tank that sits at the flank of the Fremont National Forest, directly west of Paisley.

A hydraulic model of the distribution system was prepared with normal water demands as well as fire flow demands. The resulting pressures for normal and fire flow demands are shown on the attached maps with the pressure areas color coded. Pressures are adequate under both normal and fire flow demands.

2.9 Storage Systems

Water storage for the City consists of a 200,000-gallon steel tank as shown in Figure 7. This tank was built during the original construction of the system to allow for adequate storage needs for Paisley and has recently undergone a successful integrity inspection (see Exhibit 1). Required storage needs are based on an average day's demand, plus additional waters required for fire flow. One day's demand for 250 people is estimated to be 62,500 gallons and fire flow demand is (500 gpm * 2-hours) 60,000 gallons. Therefore, the minimum storage requirement for the entire system of Paisley is 122,500 gallons. It has been noted that two out of the last three summers, Paisley has been the focus for major wildland firefighting operations. Fire trucks can utilize a truck dump to fill their tanks with water. However, doing this causes residences to lose water pressure for the amount of time it takes the well pumps to begin pumping, treating, and moving water into the storage tank. Additional storage specifically for fire-fighting purposes might be advantageous, but is not considered a high priority at this time. An automatically controlled pumping system for the well pumps would also help to keep the tank at a higher fill level, improving the pressures.

3.0 Water Quality and Level of Service Goals

The City of Paisley wishes to supply quality water services to the residents and businesses of Paisley. Therefore, the City has developed four goals for the water system, considering existing and future regulatory requirements, regulatory and non-regulatory water quality needs, flow and pressure requirements, and capacity needs.

3.1 Goal #1: Provide Customers with Safe, Quality Water

The City wishes to provide customers with safe, quality water by meeting both EPA and State of Oregon water quality standards. This involves meeting not only the primary EPA standards but also working toward compliance with the secondary standards.

3.2 Goal #2: Provide Adequate Water Supply to Meet Current and Future Needs

The City wishes to secure adequate water supply to meet current needs as well as future needs by maintaining existing wells and water rights and securing additional water rights and supply sources as needed.

3.3 Goal #3: Provide Adequate Water Storage

The City wishes to provide adequate water storage to meet current and future needs as well as meet fire flow demands.

3.4 Goal #4: Provide a Quality Collection and Distribution System

The City wishes to provide a quality collection and distribution system that can meet current and future needs. This includes a safe, functional distribution system and adequate backup power at wells.

4.0 Projected Growth of Water System

4.1 Population Growth

Detailed population growth estimates can be difficult to calculate for rural communities. The U.S. Census Bureau counted 7,895 Lake County residents during the 2010 national census. Portland State University Office of Population Statistics roughly concurs with the U.S. Census Bureau. Additionally, Portland State projects the Lake County population to be 8,517 by the year 2040.

Portland State's Coordinated Population Forecast for Lake County (2018-2068) forecasted a 0.9% growth rate for the City of Paisley for the period 2010-2018 and a 0.2% growth rate for the period 2018-2043. Paisley's population in 2010 was approximately 243. Utilizing Portland State's growth rates, that would put current population at approximately 263. The projected population for 2041 would be 273.

This report will utilize the annual growth rates forecast by Portland State to determine future population and water usage. It is also worth mentioning that future demand of water can be influenced by several factors other than population growth. New construction will utilize newer appliances which are built with conservation in mind, such as low-flow toilets and restricted flow faucets for showerheads. Price increases reflecting operational and maintenance costs may tend to change the usage patterns of existing customers. New development demand may also impact future usage.

4.2 Future EDU

Table 5 summarizes the current and future EDU for Paisley based on a population growth rate of 0.2% per year. The projected population and EDUs include the entire Paisley Water System service area, both within and outside of city limits. Projected EDU growth has been calculated for the planning period of 20 years. The projected growth in EDU is expected to come from additional residential customers as well as new commercial users as there is room for growth within the commercial sector of the Town of Paisley.

Current Population	260
20 Year Projected Population at 0.2% Growth	273
Current EDU – Infrastructure Finance Authority (IFA) Basis	245
20 Year Projected EDU – IFA Basis	256
Current EDU – Rural Development (RD) Basis	160
20 Year Projected EDU – RD Basis	167

Table 5: Projected EDU growth for Paisley

4.3 Impacts on Service Area Boundaries

The projected population growth is not expected to have any significant impact on the water system service area boundaries. There is adequate land available for development within the existing City limits, making it unlikely that the system boundary will expand significantly in the 20-year planning period.

4.4 Impacts on Water Supply Source and Availability

The current water supply sources provide an adequate capacity to accommodate the projected population growth in the service area. Based on water rights, the City of Paisley has the right to pull 542,900 GPD from the Chewaucan River Basin without any additional water rights. Paisley used 135,500 GPD during July of 2019; which was the highest water-use month for the last three years. Comparing those two figures, it becomes quite clear that projected population growth will not tax Paisley's existing rights capability. However, with the proposed new well to be added to the system, it is assumed it will have equivalent water rights as that of Well #2 or #3, one of which will be decommissioned. The City may apply for additional water rights when starting work on the new well or just add a new source as an additional point of appropriation on the existing permit. Adding a new point of appropriation would maintain the priority date for the right.

Within the urban growth boundary of the City of Paisley, all potential aquifers for the location of a new well would be located within the Chewaucan River Basin. However, within this basin, there are multiple aquifers available as municipal water sources. Currently, Wells #2 and #3 do contain arsenic contamination. Correlating the wells logs (see Exhibit 3) for each of those wells, noting specifically where the perforations for each of the wells line up, it can be assumed that at least one aquifer, if not multiple aquifers, within the depth range of 83 feet to 122 feet contain arsenic contamination. In Well #2, perforations do extend deeper down, and although Well #1 is approximately 300 feet to the south of the other wells, it is perforated deeper than 122 feet and shows no signs of arsenic contamination. Thus, it can be assumed that arsenic contamination is isolated to an aquifer(s) within the perforation range of Well #3. As a result, evaluation of water quality needs to be performed through sampling during initial drilling of a new well. Choosing a location that will allow for a deeper well with the possibility of no arsenic contamination will be the goal. It is proposed that the new well be located as far to the south and east to allow the new well to be located within a thicker package of strata with more potential for uncontaminated aquifers and higher yields. A detailed study of existing well logs for the area will be used in planning the location of this well once funding is secured.

Paisley also has adequate storage to accommodate the 20-year population growth projections. Increasing Paisley's storage capacity for municipal-use waters is not necessary at this time.

Distribution system improvements, backup power to well pumps, drilling a new well, and fixing the aforementioned vaults are of more immediate concern; no new storage capacity is recommended at this time.

4.5 Impacts on Customer Water Use

Total system usage will increase as the population increases. The projected increase in EDUs over the 20-year planning period will result in a water usage increase of approximately 0.2% per year. New commercial or industrial operations could further produce an increase in water usage. Depending on the type of operation, high rates of water may be needed. However, anticipated usage increase is well within the available supply capacity and as of now, no new high water-use commercial or industrial business expansions within Paisley is on the horizon. Table 6 shows projected water usage over the next 20 years.

Year	Projected Average Usage (gallons/day)	Projected Maximum Usage (gallons/day)	Projected Annual Usage (gallons)
2020	60,434	135,500	22,058,410
2021	60,555	135,771	22,102,527
2022	60,676	136,043	22,146,732
2023	60,797	136,315	22,191,025
2024	60,919	136,587	22,235,407
2025	61,041	136,860	22,279,878
2026	61,163	137,134	22,324,438
2027	61,285	137,408	22,369,087
2028	61,408	137,683	22,413,825
2029	61,531	137,959	22,458,653
2030	61,654	138,235	22,503,570
2031	61,778	138,511	22,548,577
2032	61,900	138,788	22,593,674
2033	62,024	139,065	22,638,862
2034	62,148	139,344	22,684,139
2035	62,273	139,622	22,729,508
2036	62,397	139,902	22,774,967
2037	62,522	140,181	22,820,517
2038	62,647	140,462	22,866,158
2039	62,772	140,743	22,911,890
2040	62,898	141,024	22,957,714
2041	63,023	141,306	23,003,629

Table 6: Projected Water Usage

5.0 Ability of Existing System to Meet Water Quality and Service Goals

Paisley's water system is currently functioning but distribution system components are aging and the system is experiencing more frequent maintenance issues including leaks.

The following is an analysis of the existing system's ability to meet Paisley's level of service goals, including a description of the existing deficiencies and any deficiencies expected in the future.

5.1 Water Supply

Paisley's existing water supply source is adequate to supply current and projected needs. The City has water rights allowed for 542,900 GPD, and the current high-demand needs are approximately 135,500 GPD. Projected system growth estimates high-demand needs in 2041 to be approximately 141,306 GPD (see Table 6).

Existing and Anticipated Deficiencies

Although Paisley already has adequate water rights and developed supply sources, there is an issue with interreference between Wells #2 and #3. Due to the underlying geology of the Paisley area, alluvial and fluvial deposits exist with the potential for multiple water-bearing strata. If two wells are drilled into the same water-bearing zone, they can deplete a particular aquifer and/or create zones of depression within the aquifer, further impeding the transmissivity of the aquifer in question. Wells #2 and #3 are located very close to each other and the perforations of Well #3 coincide with the zone of perforation within Well #2. This means the two wells are drawing from the same aquifer and cannot be operated simultaneously. Also, the operator has noticed a drop in the static water level of both wells. This has the potential to create a supply issue in the future. Also, this limits Paisley's ability to utilize all the water rights they have should the need arise to run all three wells at the same time, such as during major firefighting events.

5.2 Water Quality

As previously discussed, the EPA and the State of Oregon have stringent water quality laws designed to ensure public safety. Paisley's water sources are of adequate quality to support all municipals uses now that an arsenic treatment system has been successfully established.

Existing and Anticipated Deficiencies

Currently, Wells #2 and #3 are treated for arsenic contamination at a treatment center located at Well #1 (see Fig. 8). According to water analyzes, arsenic contamination is being successfully treated and municipal-use water in Paisley is in compliance with primary and secondary EPA standards. Lead levels above zero have occasionally been detected in the system. These levels have generally been below action levels and have not been consistently detected during sampling. However, the proposed rule changes related to lead levels may impact sampling and testing requirements if lead is detected in the future. See Exhibit 4 for the EPA's current water quality standards.

5.3 Storage Capacity

Paisley's system currently has 200,000 gallons of storage capacity. This is adequate to meet the system's storage needs for the next 20 years.

Existing and Anticipated Deficiencies

There are no existing deficiencies with the system's storage capacity. It is adequate to meet the storage requirements for the current system.

Projected system growth over the next 20 years is not anticipated to significantly increase storage needs. No future deficiencies related to storage capacity are anticipated.

5.4 Distribution System

Paisley operates and maintains over 4 miles of pipe within their distribution system. Approximately 20 feet has been replaced with PVC pipe, but the majority of the distribution system is original asbestos concrete installed in 1972. There are adequate valves and hydrants within the distribution system, generally located at every street intersection making isolating portions of the system simple. Although some appurtenances within the distribution system are in good working order, other valves and hydrants are failing and not working properly. The distribution system covers all portions of Paisley at this time.

Existing and Anticipated Deficiencies

System leaks are becoming a common occurrence. The operator and manager of the system agree that the system is losing approximately 30% of water pumped from the wells through leaks throughout the distribution system. There has been a significant increase in leaks and repairs that are required to fix these leaks in the past year (see Fig. 10). The majority of the piping is asbestos concrete. As mentioned in Section 3.1, asbestos concrete has been shown to degrade over time such that asbestos leaches from the pipe into the drinking water. Due to the

nature of the pipe material and age, it is only a matter of time before the degradation of the pipe becomes such that municipal-use waters become contaminated with asbestos. Exhibit 2 includes an article from Water World magazine from February 1, 2019 highlighting the dangers and providing more detailed information about asbestos concrete used as water pipes.

It is recommended that all asbestos concrete pipe be replaced with PVC at this time to allow the City of Paisley to be proactive about their distribution system and not wait until something fails or people start getting sick before replacing portions of pipe. Meters are currently in good working order and it is not recommended that these be replaced. However, valves and hydrants are showing evidence of failure and should be replaced as the new PVC water line can be tied directly into these new appurtenances.

Figure 10: Image of a leak discovered in the distribution system where pipe has been exposed to fix the leak.

There are also two specific concrete vaults which house valves that need to be repaired. One such vault is directly adjacent to the storage tank. The vault itself is in good working order. However, the valves within the pipe are leaking, causing the vault to flood. When the vault is flooded, it must be pumped dry in order for repairs to be made. Each time a repair on some part of the valve is made, additional leaks are noted and the vault is filled with water again. There is also no lid on this vault and there are no locked gates preventing public access to the storage tank, which is a safety concern. In additional to fixing or replacing plumbing within the valve system in the vault, a lid must be installed. See Figure 11 for an image of this vault while flooded.

In a second vault, located within the U.S. Forest Service housing area, the vault itself is leaking. This leak allows groundwater to enter the vault and submerge the valves and piping. This is creating damage to the pipes and valves that will need to be corrected (see Fig. 12). The north

wall of this vault shows evidence of bowing and will eventually fail completely as hydrostatic pressure continues to push against the wall with increasing pressure as the leaking persists and enlarges over time.

Several of the valves located throughout the system do not function properly. This can cause difficulties if a section of the system needs to be shut off to perform repairs. Valves should be exercised yearly to keep the valve from corroding and freezing. Also, there are several fire hydrants that are either leaking or not working properly (see Fig. 13). This creates a safety issue if fire personnel cannot utilize the hydrant during a fire.

Figure 11: Image of inside the vault at the Forest Service outpost filled with groundwater. Note the level of encrustation visible on megalugs and flanges.

Figure 12: Image of vault. Note the bowing around the pipe grout. The grout itself was not installed to appear bowed, bowing is due to hydrostatic pressures pushing again the vault.

Figure 13: Image of a hydrant that does not work.

5.5 System Pressure

The system needs to be able to provide constant pressure and avoid pressure drops during high demand and fire flow. Static pressures currently range from 45 psi to 80 psi. The minimum pressure allowed by the Oregon Public Health Department is 20 psi. Wells #2 and #3 pump into a treatment center at Well #1, where waters are injected with chlorine and treated for potential arsenic contamination. All waters are then routed directly to the west into the storage tank. The storage tank utilizes over 125 feet of head pressure to route waters at sufficient pressure throughout the entire distribution system.

Existing and Anticipated Deficiencies

There are no existing or anticipated deficiencies related to system pressure. However, increasingly dry conditions have led to increased wildfire activity in the area. Over the last several years, Paisley has often been the center of firefighting activities for major wildfires in the area. It was noted that as fire trucks continued to obtain water from a municipal truck dump located within the Forest Service ranger station, the City lost water pressure while the storage tank was recharged. This issue will be addressed and mitigated through drilling a new well located in a different aquifer and adding automatic controls to the well pumps. If all three wells were pumping at the upper limit of the water rights on each well, this system would have been able to keep up with firefighting needs.

5.6 Water Source Protection

The ultimate source of all City waters is ground water in the Chewaucan River Basin. All wells tapped into this basin are located on or adjacent to pasture lands, with the Fremont National

Forest located directly up slope to the west. There are no potential contamination sources within the cones of depression of all wells.

Existing and Anticipated Deficiencies

There are no existing or anticipated deficiencies related to water source protection at this time.

5.7 System Operation

The system operator is responsible for reading water meters, maintaining storage levels, ensuring continuity of service, etc. All well pumps and system storage are manually controlled. The system operator has been able to maintain continuous service and provide accurate and timely meter readings. All meters are in good working order and need little maintenance. The arsenic treatment and chlorine injection system are functioning correctly. Valves and hydrants are not all in good working order making system repairs difficult.

Existing and Anticipated Deficiencies

The major deficiency within the operational activities of the system is the lack of backup power at the wells. Without backup power to each pump, the operator may not be able to maintain adequate volume or pressure of water if the pumps or power fails at the wells. Water treatment would also be unavailable if power was lost. Additionally, the City of Paisley is a small, rural community and it may take considerable time to reestablish electrical service after a major outage event. The lack of backup generators at the wells could result in water service being unavailable to the citizens of Paisley for extended periods of time.

6.0 Alternatives to Correct Deficiencies and Achieve Expansion to Meet Growth Projections

Paisley's water system has the following deficiencies:

- Aging asbestos concrete piping throughout most of the distribution system.
- Aging fire hydrants and valves.
- Vaults that are leaking and need repairs.
- Inadequate backup power at wells.
- Water quality, supply, and control issues.

6.1 Distribution System

Alternative #1 – Replace All Aging Distribution System Components

One option is to completely replace all original asbestos concrete pipe, associated valves and fire hydrants, and repair the leaking vaults. There are approximately 4.6 miles of pipe that would need to be replaced. All original valves and hydrants would also be replaced at this time; there are a total of 16 hydrants and 71 valves that would need replaced. The vaults that are leaking would be repaired as well. There is very little tracer wire on the system mainlines, which makes locating the piping more difficult. The system maps are thought to be fairly accurate, but there is still some uncertainty as to exact location and depth for piping. Tracer wire would be added to the replaced pipe to ensure distribution lines can be precisely located.

The estimated construction cost for this alternative is $1,989,575.

Alternative #2 – Replace Aging Distribution System Components in Phases

Replace portions of the system in phases. The City would replace sections as they began to fail and exhibit increased leaking or repair issues. This has the potential for additional costs because a contractor would have to mobilize to repair sections multiple times. Only replacing sections after they fail puts additional stresses on the adjacent original pipe, which can lead to future failures. This alternative also does not mitigate the potential for asbestos contamination.

The estimated construction cost for this alternative is $431,000 per mile.

6.2 Well Backup Power

Alternative #1 – Install Diesel Generators at All Wells

Install diesel generators to provide backup power at all three wells. This would allow for the system to remain functional during a catastrophic power failure. Generator pads are already

present at the well houses for Wells #2 and #3. A concrete pad for a generator would need to be installed at Well #1.

The estimated cost for this alternative is $135,000.

Alternative #2 – Install Diesel Generator at Well #1

Install a diesel generator at Well #1, which is the primary well and treatment center used in the system. This option would allow for the primary source well to ensure proper system function during times of low need, or to allow for partial system operation during times of high need. A concrete pad for a generator would need to be installed at Well #1.

The estimated cost for this alternative is $45,000.

Alternative #3 – Do Nothing

The third alternative is to not install backup power at this time. This is not recommended because there would be no way to ensure system operation in the event of an extended power outage.

There would be no additional cost for this alternative.

6.3 Water Supply & Quality

Alternative #1 – Drill a New Well

Drill a new well in another location that would utilize a different water aquifer. This would resolve the interference between Wells #2 and #3 and allow three wells to operate at once if necessary. The new well should be located as far to the southeast of Well #1 as possible. Water quality sampling and adjacent well log investigations will be performed to help determine a final location for the new well. Either Well #2 or #3 would be decommissioned, depending on the results of a camera inspection. Ideally, the pump from the decommissioned well can be utilized by the new well to save on costs. This alternative resolves the interference and potential supply issues and could also yield a water source free from arsenic contamination.

The estimated construction cost for this alternative is $750,000.

Alternative #2 – Do Nothing

Do not drill a new well at this time. The aquifer that Wells #2 and #3 are tapped into may or may not deplete in the near future. However, these wells are relatively shallow and this option would allow the interference to continue and restrict use to one well at a time.

7.0 Financing Alternatives

A variety of financing alternatives are available for the financing of water system improvement projects. These include general obligation bonds, private financing through commercial banking institutions, and grants and loans from public funding agencies.

7.1 General Obligation Bonds

General obligation bonds are a common type of municipal bond where a local government uses a property tax to meet debt service requirements. General obligation bonds require approval by the voters in a local taxing district as the bond is paid back through increased taxation. Due to the availability of other financing for small communities a general obligation bond is usually not required.

7.2 Commercial Bank Financing

The City could also seek loan financing from commercial banking institutions. Interest rates from these institutions tend to be higher than funding agencies and there would be no possibility of loan forgiveness or grant components.

7.3 Business Oregon- IFA (Business Oregon – Infrastructure Finance Authority)

Business Oregon provides a variety of financing programs that are available to small municipalities. Available programs offer both grant and loan options, based on the eligibility of the applicant.

Community Development Block Grant (CDBG)

The CDBG program offers grant funding for projects that benefit current residents in a primarily residential area. However, the CDBG program requires that 51% or more of a City's population be comprised of low to moderate income persons. This is a possible source of grant funding but the City would need to conduct an income survey to see if they meet the eligibility requirements.

Water/Wastewater Financing Program

Business Oregon offers low interest loan options through the Water/Wastewater Financing Program. The loan program funds the design and construction of public infrastructure needed to ensure compliance with the Safe Drinking Water Act or the Clean Water Act. In order to be eligible for this funding, a system must receive, or is likely to receive, a Notice of Non-Compliance by the appropriate regulatory agency. The maximum loan term is 25 years and the maximum loan amount is $10 million. Grants up to $750,000 may be awarded based upon a financial review and must be matched 1:1 with a loan from this program.

Safe Drinking Water Revolving Loan Fund

To qualify for funding through the Safe Drinking Water Revolving Loan Fund the City would be required to submit a letter of interest and the project would be prioritized by the Oregon Health Authority – Drinking Water Services. If the community qualifies as disadvantaged the program does provide low interest rates of 1.0% to 3.30% and up to 30-year terms. The City would be required to take on loan financing until the user rates reached the affordability rate, after which there may be opportunities for loan forgiveness.

Special Public Works Fund

Business Oregon also offers financing through the Special Public Works Fund. This program has a direct interest rate of 4.13% for 25 years. There would be no grant component available for Paisley. This is a job creation program and only provides grants for job creation with firm business commitments.

7.4 USDA-RD (United States Department of Agriculture – Rural Development)

USDA-RD offers affordable funding to develop essential community facilities in rural areas. They offer direct loan options with terms up to 40 years. Grant assistance is also provided on a graduated scale with smaller communities with the lowest median household income being eligible for projects with a high proportion of grant funds.

7.5 OWRD (Oregon Water Resources Department)

OWRD provides funding through the Water Supply Development Account. This program provides loans and grants for water development projects that have economic, environmental, and social/culture benefits. Grants from this program require a 25% cost-share match, which may include in-kind contributions. This option is applicable to projects that involve water saving or aquifer storage. This should not be overlooked and should be investigated but is rarely used on general municipal water improvement projects.

At this time, there are also some additional state and federal resources available to communities. Coronavirus relief funds and potential infrastructure funding could be a resource for the City and should be explored.

8.0 Recommended Water System Improvement Program

The needs of Paisley's water system can be prioritized as followed:

1. Drill a new well that draws water from a different aquifer and location to avoid both the potential contamination of arsenic and the risk of being in the same zone of inclusion as the existing wells.
2. Provide backup power for at least one of the existing wells.
3. Upgrade the distribution system by replacing the aging asbestos concrete piping, aging valves and fire hydrants, and repairing vaults.

8.1 Recommended Alternative for Improvement Program

Ideally, the City should complete priorities #1-#3 in a single project. This is the most efficient approach and would correct all the major deficiencies at one time.

Water System Improvement Project (Priorities #1-3)

The combined improvement project would include the following:

1. Drill a new well in a different location to avoid interference with existing wells.
2. Install a diesel generator at Well #1 to provide backup power.
3. Replace all aging asbestos concrete piping.
4. Replace all aging valves and fire hydrants.
5. Repair leaking vaults.

Well location will be determined by well log investigations and water sampling. The project will involve drilling the well, constructing a well house, installing pump and control components, and connecting the well to the City's system. Either Well #2 or #3 will be decommissioned. If at all possible, the pump from the decommissioned well will be transferred to the new well. A diesel generator and concrete pad will be installed at Well #1, which will be a relatively simple process. The largest component of the project will be upgrading the distribution system. This will involve replacing old piping with new PVC piping as well as replacing valves, fire hydrants, and repairing the leaking vaults.

Addressing all three priorities in a single project would be more efficient and would immediately correct all of the deficiencies and mitigate the risk of asbestos contamination. However, the estimated cost for this project is $3,319,262 which is a significant financial investment. The City may not be able to secure adequate funding or handle that large of a debt payment.

State and federal funding sources are offering additional funding at this time for infrastructure projects. The City should aggressively explore these options as it may be possible to obtain significant grant funding that would allow all three priorities to be completed in a single project.

Phase Approach

If all priorities cannot be addressed in a single project, the recommended phased approach is to address priorities #1 and #2 in a single project, as soon as possible. The potential supply issue caused by the interference between Wells #2 and #3 and the lack of backup power at wells are the primary concerns at this time. A new well will allow the City to fully utilize their available water rights and help maintain adequate water supply for the system. Providing backup power at Well #1 would be the most cost-effective option to maintain system operation in the event of a prolonged power outage. Once these improvements are complete, the City could focus on completing the upgrades to the distribution system.

8.2 Cost of Recommended Improvement Projects

The estimated cost to complete all components of the recommended improvement project (Priorities #1-3) is $3,319,262. This includes estimated construction costs as well as engineering design and administrative costs. If the project is completed in phases, the cost to complete the well/backup power phase is $984,250 and the cost to complete the distribution system phase is $2,400,012. Table 7 provides a detailed description of the project costs for all three options.

	Combined	**Well/Backup**	**Distribution**
Construction	$2,784,575	$795,000	$1,989,575
Construction Contingency	$278,458	$79,500	$198,958
Engineering	$139,229	$39,750	$99,479
Administration	$20,000	$10,000	$20,000
Permits	$25,000	$15,000	$20,000
Environmental Review	$25,000	$15,000	$25,000
Cultural Monitoring	$30,000	$20,000	$30,000
Legal	$7,000	$5,000	$7,000
Labor Standards	$10,000	$5,000	$10,000
Total	**$3,319,262**	**$984,250**	**$2,400,012**

Table 7: Engineer's Opinion of Probable Costs

8.3 Financial Analysis

A preliminary financial analysis for all three options has been prepared to determine loan payment amounts and water user rates.

	Business Oregon Loan (30 years at 1.5%)			USDA-RD Loan (40 years at 3.125%)		
	Well/Backup	*Distribution*	*Combined*	*Well/Backup*	*Distribution*	*Combined*
Eligible Project Costs	**$ 984,250.00**	**$ 2,400,012.00**	**$ 3,319,262.00**	**$ 984,250.00**	**$ 2,400,012.00**	**$ 3,319,262.00**
Annual Loan Payment	**$ 40,983.37**	**$ 99,934.55**	**$ 138,211.38**	**$ 43,445.66**	**$ 105,938.64**	**$ 146,515.14**
Operation/Maintenance Expense	$ 110,000.00	$ 110,000.00	$ 110,000.00	$ 110,000.00	$ 110,000.00	$ 110,000.00
Capital Improvement Reserve	$ 24,750.00	$ 24,750.00	$ 24,750.00	$ 24,750.00	$ 24,750.00	$ 24,750.00
Total Operating Expenses	**$ 134,750.00**	**$ 134,750.00**	**$ 134,750.00**	**$ 134,750.00**	**$ 134,750.00**	**$ 134,750.00**
Revenue	**$ 99,000.00**	**$ 99,000.00**	**$ 99,000.00**	**$ 99,000.00**	**$ 99,000.00**	**$ 99,000.00**
Resulting Rate/Connection						
Current EDUs	245	245	245	160	160	160
Additional Rate/EDU	**$ 26.10**	**$ 46.15**	**$ 59.17**	**$ 41.25**	**$ 73.80**	**$ 94.93**
Current Rate/EDU	$ 26.50	$ 26.50	$ 26.50	$ 28.50	$ 28.50	$ 28.50
New Rate/EDU	**$ 52.60**	**$ 72.65**	**$ 85.67**	**$ 69.75**	**$ 102.30**	**$ 123.43**

*** EDU is based on monthly water usage - 7,500 gal for Business Oregon and 11,500 gal for USDA. Current minimum rates (3/4" pipe) for the City of Paisley have been adjusted to reflect the EDU usage amounts.

Figure 14: Preliminary Financial Analysis

The analysis assumes the entire project cost is financed through a loan from either Business Oregon or USDA-RD. The Business Oregon option assumes a loan through the Safe Drinking Water Revolving Loan Fund. The interest rate has been estimated at 1.5%, which assumes Paisley can qualify as a disadvantaged community. The interest rate for USDA-RD has been estimated at 3.125%. Revenue and expense information is based on data from the City of Paisley 2020 audit.

Revenues

The City of Paisley currently receives approximately $99,000 in annual water service revenue.

Costs

The current annual operation and maintenance costs for the system are approximately $110,000. The recommended capital improvement reserve commitment is $24,750 annually (25% of annual revenues). The projected cost for the combined project is $3,319,262 and the projected costs for the phased approach is $984,250 for the well/backup power and $2,400,012 for the distribution system.

Annual loan payment amounts are:

	Combined	Well/Backup Power	Distribution
Business Oregon	$138,211.38	$40,983.37	$99,934.55
USDA-RD	$146,515.14	$43,445.66	$105,938.64

Projected Water Rates

The City of Paisley water system has a total of 245 EDU for Business Oregon funding options and 160 EDU for USDA-RD funding options. The resulting minimum monthly water rates per EDU for each option are:

	Combined	Well/Backup Power	Distribution
Business Oregon	$85.67	$52.60	$72.65
USDA-RD	$123.43	$69.75	$102.30

This is a fairly substantial increase in customer rates. However, as mentioned in Section 7, there are currently alternative funding options from state and federal relief packages that may be available to assist the City in funding their water improvements. These options should be explored as they may provide grant funds and allow the City to reduce the amount of customer rate increases.

An alternative financial analysis that reflects $1,000,000 in loan funding is shown in Figure 15. This significantly reduces the user rate increases for the combined project and distribution phase options.

	Business Oregon Loan (30 years at 1.5%)		USDA-RD Loan (40 years at 3.125%)	
	Distribution	*Combined*	*Distribution*	*Combined*
Eligible Project Costs	**$ 1,400,012.00**	**$ 2,319,262.00**	**$ 1,400,012.00**	**$ 2,319,262.00**
Annual Loan Payment	**$ 58,295.36**	**$ 96,572.19**	**$ 61,797.76**	**$ 102,374.26**
Operation/Maintenance Expense	$ 110,000.00	$ 110,000.00	$ 110,000.00	$ 110,000.00
Capital Improvement Reserve	$ 24,750.00	$ 24,750.00	$ 24,750.00	$ 24,750.00
Total Operating Expenses	**$ 134,750.00**	**$ 134,750.00**	**$ 134,750.00**	**$ 134,750.00**
Revenue	**$ 99,000.00**	**$ 99,000.00**	**$ 99,000.00**	**$ 99,000.00**
Resulting Rate/Connection				
Current EDUs	245	245	160	160
Additional Rate/EDU	**$ 31.99**	**$ 45.01**	**$ 50.81**	**$ 71.94**
Current Rate/EDU	$ 26.50	$ 26.50	$ 28.50	$ 28.50
New Rate/EDU	**$ 58.49**	**$ 71.51**	**$ 79.31**	**$ 100.44**

Figure 15: Financial Analysis - $1,000,000 Grant Funds

8.4 Recommended Schedule

Figure 16 is a recommended general schedule to complete the combined improvements project.

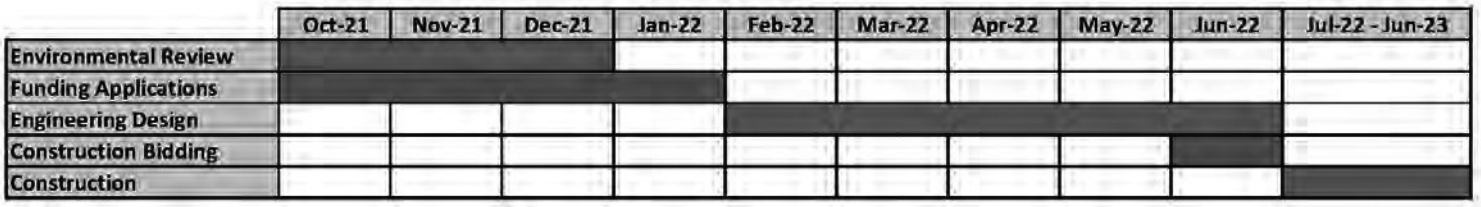

Figure 16: Proposed Schedule

9.0 Requirements of Water Management and Conservation Plans

The City of Paisley is required to submit a Water Management and Conservation Plan (WMCP) under their water right permit G-12876. A WMCP was submitted by the City of Paisley with revisions and approved by Oregon Water Resources Department (OWRD) pursuant to OAR 690-086-0100(3) in 2003 (retroactively effective November 1, 2002). This WMCP was deemed consistent with OAR Chapter 690, Division 086, as adopted by the Water Resources Commission in 1994. Approval of this plan remained in effect until December 20, 2009, at which time the City was required to submit an updated WMCP no later than December 20, 2009. Unfortunately, an updated WMCP was never submitted by the City. Therefore, the updated WMCP will be included in this section of the Master Plan to bring the City back into full compliance.

9.1 Introduction

Water conservation consists of any reduction in water loss, waste, or consumption that is beneficial to the water supply or water supplier. Conservation planning is an increasingly important management practice for water providers who address increasing demands for water supplies, limited resources, and demands for more financial responsibility. Water that is conserved, in effect, becomes a new and relatively inexpensive source of water for the utility.

Conservation can have the effect of helping water providers avoid, downsize, or postpone water expansion projects. Capital costs, maintenance costs, financing costs, and many other expenses may be reduced by effectively practicing conservation within the existing water system. Additional benefits for the environment include restoring stream flows to support aquatic and wildlife, providing recreational opportunities, and maintaining water quality. The investment that water system managers and operators make in conservation planning will yield savings that can be measured in terms of reclaimed water resources, labor resources, and related operating expenses.

A WMCP is a plan developed by a water supplier, in this case the City of Paisley, that describes the water system and its needs, identifies its sources of water, and explains how the water supplier will manage and conserve those supplies to meet present and future needs. The Oregon Water Resources Department (OWRD) reviews WMCPs based on the requirements found in OAR 690-86. Much of what is required in a conservation plan is provided for in the Master Plan, except specific conservation and curtailment elements. The following sections of the Master Plan have been prepared to satisfy the conservation requirements outlined in OAR 690-86.

9.2 Affected Local Government

The Plan was submitted to all affected local governments, listed below, along with a request for comments related to consistency with the local governments' comprehensive land use plan.

- City of Paisley

Comments received from the City were incorporated into the final plan.

9.3 Plan Update Schedule

The City proposes to submit an updated WMCP at the end of a 10-year period in 2031.

9.4 Previous Water Resource Planning

The City submitted a WMCP to OWRD on November 14, 2000; a WMCP is required by Water Rights permit # 12876. Public notice was published on December 11, 2000, as required by OAR 690-86, but no comments were received. OWRD reviewed the plan and requested revisions from the City of Paisley. The City of Paisley agreed to revise the plan and resubmit to OWRD through a letter dated May 19, 2003. The WMCP was then approved by OWRD, effective retroactively as of November 1, 2002, and remained in effect until December 20, 2009. An updated plan was not prepared or submitted in 2009. The City was notified in March 2021 that they were deficient in their WMCP requirements. Since the City was in the process of preparing a Master Plan, OWRD stated the update WMCP information could be included in the Master Plan document.

9.5 Existing Water System

Details on the existing water system can be found in Section 2 of this Master Plan.

9.6 Water Usage Patterns

Detail on current and future water usage patterns can be found in Sections 2 and 4 of this Master Plan.

9.7 System Deficiencies

Details on the current water system deficiencies and their subsequent solutions can be found in Sections 5 and 6 of this Master Plan.

9.8 Water Curtailment Plan

The City of Paisley currently has a Water Curtailment Plan Ordinance where customers can be required to limit use of water when supply shortages are encountered as part of a major effort