High Lostine Owners Association
Water System 30-Year Plan (2018 – 2048)

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1.0 Introduction

In the fall of 2015, the HLOA Board of Directors (Board) requested that the Water Committee develop a 30-Year Plan for the water system. The Plan was completed in January 2019, and delivered to, discussed by, and approved by the Board.

The 30-Year Plan describes how the water system is managed and provides a long-term plan for maintaining, operating, and improving the water system. The Plan fulfills Oregon statutes for owners associations (ORS 94.595) and protects the value of each owner's property.

The Water Committee consults the Plan annually for development of its annual expenditure and revenue requests. The Board uses the Plan as a basis for making decisions on annual expenditure and revenue requests. The Plan is to be reviewed, revised, and approved by the Board every 5 years. The revision may be in the form of approved change documents or a new 30-Year Plan.

The Plan is organized as follows:

2.0 Background

2.1 Overview of Water System

The High Lostine Water System is owned, managed, and currently (2019) operated by landowners in the High Lostine "Subdivision". The High Lostine is located seven miles south of Lostine, Oregon and is composed of 38 privately owned lots and two lots that are collectively owned by the High Lostine Owners Association (HLOA). One of these lots is grandfathered into the development with an existing well and does not participate in the HLOA water system. As of January 2019, there are 12 connections serving 23 full-time residents and 17 connections serving part-time and absent owners.

The water system consists of a 50,000 gallon reservoir and distribution system (installed 1980 -1981); a community well (drilled in 1991); a heated well house with meter, pressure gauge, and sampling line; a telemetry control system that manages the pump and water level in the reservoir (installed 2010); an in-well water level sensor and thermometer with automated data collection (installed 2019); and meter boxes serving the privately owned lots. Each lot using water has a meter, shut-off valve, and backflow prevention valve in the meter box. There are 9 fire hydrants and 4 barrels containing fire-fighting supplies. The total replacement cost of the water system is roughly $600,000 in 2017 dollars (details in section 4.2).

An application for ground water rights was submitted to the Oregon Water Resources Department on May 26, 2000. The Department granted the HLOA permission to use ground water in October 2002. The Department later extended the time to submit the "application of water to full beneficial use" to no later than October 1, 2036. A water right authorizes a specific volume of use based on actual past use; because the number of connections continues to increase it is appropriate to continue to defer the application for full approval of water right.

2.2 Division of Responsibilities

The subdivision lot owners are responsible for the Water System. They function through their Board of Directors, who are elected in accordance with the CC&Rs. The Board delegates Water System duties to the Water Committee members, the Water System Liaisons, and the HLOA Treasurer. A more detailed description of duties is described in the HLOA Water System Operations and Maintenance Manual.

- The HLOA owners, via their Board of Directors, are responsible maintaining a viable water delivery system to the lots. Individual owners are responsible for connecting to the system, using water, and contributing to finances in accordance with policies.

- The HLOA Board is responsible for appointing the Water Committee and Water System Liaisons, setting policies, maintaining a long-range plan, and approving and monitoring the annual budget. The budget is the mechanism for delegating authority to the Water Committee to execute specific projects. The Treasurer collects and manages the revenues.

- The Water Committee is responsible for monitoring the performance of the system, identifying system problems, researching and recommending system improvements, submitting a proposed annual budget to the HLOA Board, managing the annual budget, submitting an annual report to the HLOA Board and membership, and submitting status reports at additional Board meetings during the year. The Water Committee also drafts policies and plans for Board review and approval and executes duties accordingly. The Water Committee members are also generally familiar with how the system operates and where the control points in the system are, and can usually identify malfunctions and failures. The Water Committee is authorized to expend funds in accordance with the approved budget and oversees the work.

- The Water System Liaisons are responsible for ensuring that the water system operates in compliance with government regulations. They obtain training for these duties and execute routine monitoring procedures. When they are notified of violations of state or federal standards or observe situations that may compromise the health and safety of High Lostine residents, they work with the Water Committee to see that the issues are resolved.

- The HLOA Treasurer bills and collects water system assessments, and tracks income, expenses, and balances. The Treasurer assures the reserve fund is managed in compliance with state regulations and to the benefit of the HLOA owners.

- Hired Water System Manager/Operator (may be necessary in the future/not applicable as of January 2019)

2.3 Past Improvements

This section summarizes historical changes in how water system revenue has been generated and allocated, and the major physical improvements that have been made to the water system.

2.3.1 Revenue Improvements

Prior to 2008, water system expenses were paid from the General Fund, which collected a per-lot annual *general* assessment. In 2008, in response to increased water system expenses, members approved a per-lot annual *water system* assessment to provide revenue for a separately-managed bank account that would pay for the water system's operating budget. In 2012, a second revenue stream – an annual water use fee based on each owner's water use – was approved by the membership. Revenue from this water use fee was first received in 2013. The use fee is based on each owner's 12-month metered water multiplied by the Board-approved water rate per 1,000 gallons.

In 2012, at the direction of the membership, the Water Committee began a series of modifications to the budget structure to better plan for, explain, and even-out the fluctuations in revenue needs. Over the years new budget line items were created for 1) a capital reserve (for long-term capital improvements), 2) short-term unanticipated repairs, and 3) medium-term emergency repairs. Water rates have increased in step with the increase in long-range planning.

2.3.2 Physical improvements

Thirteen major deficiencies in the construction of the original water system have been addressed since the HLOA was formed in 1995 (Table A). No improvements were made in the first 8 years, and 12 of the 13 improvements were made after 2009. The table does not include minor deficiencies and more than a dozen other repairs they were not upgrades to the original system. It is important to emphasize that the HLOA inherited a substandard and bare-bones water system, and the discovery of deficiencies has not abated in recent years. Past improvements (upgrades) to address these deficiencies are shown in the following table.

Table A. Known Deficiencies and Corrective Actions Taken

Deficiency	**Improvement**
No water meters or backflow valves in meter boxes	Meters and valves installed, 2004 and 2005
No insulation on reservoir, causing interior ice and eventual structural damage	Insulation installed, 2010
Unrepaired spalling of concrete from columns and roof of reservoir	Repaired and upgraded, 2010
No communication system between pump and reservoir to manage the reservoir's water level	Solar-powered telemetry installed, 2010
No supplies for responding to small fires	Barrels installed, 2011
2" main connecting well to original water system was too small, causing water hammer and recurring breaks	Replaced with 4" 235 psi rated pipe and route straightened, 2015
No 120V power at reservoir for telemetry and other uses	120V power installed from Tamarack Road to reservoir, 2016
Service lines (connecting mains to meter boxes) are substandard at bottom of system	Partially addressed with meter setter policy, 2016. Repair service lines as failures occur.
Reservoir is oversized for the population served, leading to excessive water residence time and higher potential for bacterial contamination	Partially addressed by adjusting control parameters to reduce residence time and by increasing flushing frequency at dead ends, 2017. Smaller reservoir/tank may be necessary in the future; meanwhile, solve acute problems as they occur.
No flushing hydrant on two legs of water system	Flushing hydrants installed, 2017
No low water level protection for pump	Pump-saver installed, 2017
Water hammer-induced fatigue (prior to 2015) to main at bottom of system	Partially addressed with a short distance replacement using 235 psi rated pipe, 2018. Additional 300 feet to be replaced in approximately 2020.
No system to assess adequacy of well for future growth	Automated monitoring system installed, 2019

3.0 Water System Financials

The water system's annual budget has two parts, each with their own bank account.

Operating Budget (section 3.1)

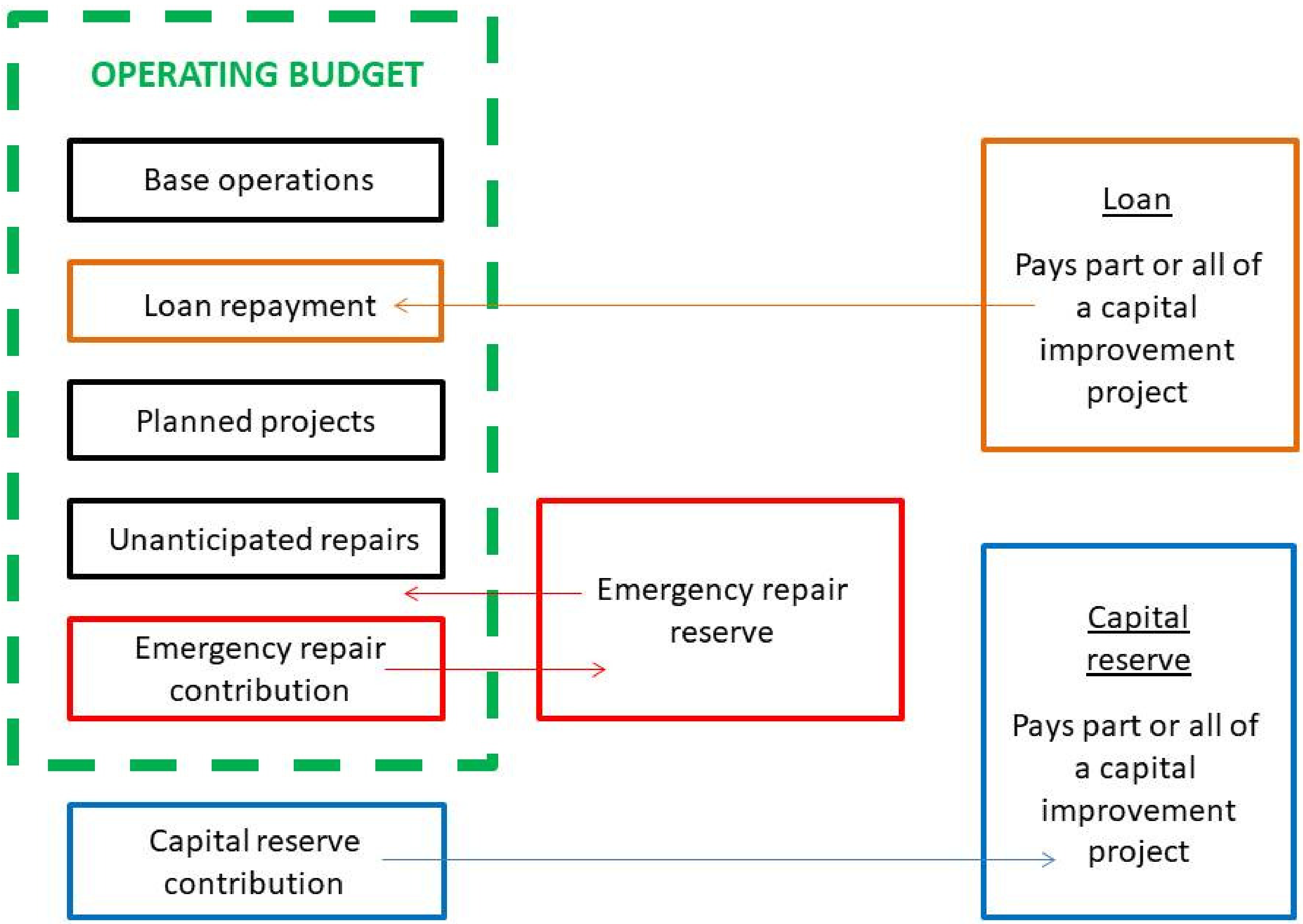
- Base operations
- Planned projects
- Unanticipated repairs
- Emergency repair reserve
- Loan payments (if needed)

Capital Reserve (section 3.2)

The annual budget runs on a 12 month "water year" running from April 1 – March 31; this synchronizes the annual budget and reporting to the annual owners meeting held in April/May.

The remainder of section 3 describes the financial structure and operations in greater detail, how revenue is managed (section 3.3) and steps in the annual budget process (section 3.4).

Figure A below shows a schematic of the financials related to the annual budget.



3.1 Operating Budget

The operating budget is divided into the following categories: base operations, planned projects, unanticipated repairs, emergency repair reserve, and loan payment, each of which is explained below.

The operating budget assigns a dollar amount to each of these categories, plus dollar amounts for each planned project. In recent years, the approved operating budget has been about $12,000 per year.

An end-of-year financial report is made line-by-line against the operating budget. The end-of-year financial report also has dollar amounts for each planned project, unanticipated repair, and emergency repair. The operating budget and the end-of-year financial report are contained within the Water Committee report at the annual meeting; owners can access the reports at www.highlostine.com

Base operations

Base operations costs recur monthly or annually. They are primarily electricity and state-mandated water analysis, but also include dues to the state water utility association, insulation for meter boxes and flushing hydrants, miscellaneous supplies and tools for monitoring and maintenance, and occasionally a part purchased for inventory. The cost in 2018 is approximately $2,000 per year, but will be multiplying several-fold in the future (see section 4.1).

Planned projects

Planned projects are *low-cost* projects identified in a given year's operating budget and can be repairs, maintenance, asset replacements, new assets, and professional services such as engineering support. The cost of individual projects is typically $1,000 to $2,000, with a maximum individual project cost of less than roughly $9,000. Expenditures have averaged $5,000 per year. The planned projects for a given year are selected based on priority and cost. To the extent possible, high priority projects are scheduled early in the year so a lower priority project can be deferred to the following year if the cumulative billed cost approaches or exceeds the budgeted amount. This category does not address high-cost asset replacements or high-cost new assets which are managed under the category of capital improvement projects.

Cost overruns on planned projects occur regularly. It is virtually impossible to obtain firm bids from the contractors we employ in Wallowa County. Experience has shown the best way to compensate for overruns is to add 30% to 40% to the estimated cost of planned projects when submitting the annual request to the Board.

Unanticipated repairs

Unanticipated repairs covers *non-emergency* events that occur almost every year, but the specific event is not known prior to its occurrence and therefore not included as a planned project in the operating budget. Unanticipated repairs are primarily telemetry system problems, minor breaks in water pipes, and installation of meter-setters, meters, or other equipment.

Historically, repair expenditures that were not planned projects have averaged $4,000 per year. Beginning in 2018, a separate line item was created for the subset of emergency repairs. Revisiting past expenditures, roughly half would be defined as unanticipated non-emergency repairs (this section) and the other half as emergency repairs.

Emergency repair reserve

Emergency repairs occur on a medium-term basis (approximately every 3-5 years) and are typically more expensive than non-emergency repairs. Emergency repairs are defined as those resulting from an acute loss of the water supply or threatening the integrity of the water system infrastructure. Examples are major breaks in water mains, pump or reservoir failure, other failures that prevent delivery of water, or a repair to prevent imminent damage to the reservoir or distribution system.

The emergency repair reserve is not a separate bank account.[i] Emergency expenditures have averaged $2,000 per year. Therefore, the operating budget includes an annual contribution to the emergency repair reserve of $2,000. The maximum balance in the emergency repair reserve is $10,000; the maximum may be changed in the future based on experience. Thus, the contribution may be less than $2,000 in some years.

If the emergency repair reserve is insufficient to pay the cost of an emergency, the remaining portion of the bill can be paid from the capital reserve.[ii] Some emergency repairs are temporary and require a follow-up repair or replacement of the asset. If the follow-up portion is high-cost (roughly $10,000 or more) it is funded from the capital reserve. If the follow-up is low-cost it is funded from either the unanticipated repairs line item or the next year's planned projects line item.

Loan repayment

Loans are necessary when the capital reserve is not sufficient to fund a capital improvement project. As of 2019 there is no loan repayment.

3.2 Capital Reserve

The capital reserve is a separate bank account established to accumulate money for *high-cost* improvement projects of roughly $10,000 or more. Such expenses are anticipated to occur once or twice a decade. A capital improvement project may be an asset replacement, new asset, or significant renovation of the water system.

Oregon statutes require a capital reserve for owners associations in order to protect the value of each owner's asset. A lot without dependable water has very little value. Capital improvement projects for new assets are estimated at $150,000 (section 4.3.4, Table C), while asset replacements which qualify as capital improvement projects total $44,000 (section 4.2, shaded text in column 6 of Table B). A special assessment could be used to pay for each capital improvement project as it becomes required. If the $194,000 were billed as five separate special assessments, then each assessment would be approximately $1,100 per lot. Many owners would be unwilling and/or unable to absorb these sharp peaks which would be occurring *on top of* the baseline water system lot assessment and water use fee. Therefore it is better to have a more stable revenue stream which accumulates money over time to pay for capital improvement projects.

To maintain a healthy balance in the capital reserve at all times, a given capital improvement project should not spend more than approximately half of the capital reserve balance. A grant may be available to partially fund some capital improvement projects. If additional money is needed a loan will be necessary.

Determining the right target amount for the capital reserve, and the rate at which it needs to be accumulated, are perhaps the most complex and difficult decisions the HLOA makes. The Water Committee continues to seek expertise in assessing the water system's long-term needs. Capital reserve targets will be periodically re-evaluated by the Board as new information is developed.

State law dictates how funds in the capital reserve may be invested. The Treasurer is accountable to assure compliance and the security of these funds.

3.3 Revenue

All revenue for the water system comes from the owners, and is based on projected short- and long-term expenses. The annual water system lot assessment is billed each January (for the current calendar year), while the water use fee is billed in May or June (for water used in the previous "water year" running from April 1 – March 31).

Allocating the revenue between the two sources is determined by the Board.[iii] The Board adopts policies for payment plans, late fees and non-payment; these are executed by the Treasurer. Individual owners are also billed for expenses the association accrues on their behalf, such as installing meters for upgrades and new connections.

3.4 Annual Budget Process

There are four steps to the annual budget process.

1. Expenditure and revenue recommendations. Each spring, the Water Committee develops a proposed budget. Expenses are determined by reviewing the 30-Year Plan and the list of water system needs that developed during the previous year. The Water Committee obtains bids for projects, prioritizes them, and assigns a dollar amount to each. The Water Committee recommends an expenditure amount for the year that includes the operating expenses plus a recommended contribution to the capital reserve. The Water Committee also recommends a revenue amount for the year. Within a few percent, the expenditure recommendation matches the revenue recommendation. With the increase in long-term planning over the past half-decade, the revenue recommendation has often required an increase in the water system lot assessment and/or water use fee.

2. Board review of the recommendations. The Board discusses the expenditure and revenue recommendations in the presence of one or more members of the Water Committee. The Board considers the 30-Year Plan when making decisions on the recommendations. The Board may propose changes to the expenditure recommendations, the lot assessment, or water use rate. Changes are discussed with the Water Committee representative(s).

3. Board decision. The Board makes the final decisions and approves an annual budget composed of line-itemized allocations, lot assessment, and water use rate.

4. Communication to owners. The Board decisions are communicated in the Water Committee annual report which is delivered verbally and in written form at the spring annual meeting of owners. In addition to the annual report, the Water Committee delivers verbal and written status reports at other Board meetings held during the year. Both types of reports include the approved line-itemized allocations and financial performance against those allocations, along with a summary of significant activities and actions taken by the Water Committee and Water System Liaisons. Both types of reports are posted at www.highlostine.com

4.0 Future Water System Costs

Section 4 discusses future costs which must be taken into account in order to identify an appropriate revenue stream and capital reserve. Several of these costs are:
- Expanded base operations (section 4.1).
- Replacement of current water system assets as they approach the end of their rated lifetimes (section 4.2).
- Purchase of new assets over time due to vulnerabilities and deficiencies in the water system (section 4.3).

4.1 Base Operations

Increased costs in base operations arise from new regulatory requirements (section 4.1.1) and a need for assistance with the operations side of managing the water system (section 4.1.2).

4.1.1 Expanded regulatory requirements

Oregon differentially enforces EPA regulations depending on the size of the user base. The High Lostine water system is currently (2019) classified as a “state-regulated system”. The water system becomes regulated as a “community water system” upon reaching either 25 full-time residents (23 currently) or 15 connections (12 currently) to households containing full-time residents. Using historical data, it is anticipated the threshold for being regulated as a community water system will be reached in 2022 or shortly thereafter.

A community water system requires more compliance activities (more frequent water sampling and analysis, problem reports, etc.) and documentation (annual consumer confidence reports, cross connection reports, water system surveys, etc.). The responsibilities of an operator under the community water system status far exceed what our already over-taxed volunteer labor can provide. The water system operator for the town of Lostine has indicated interest in being hired, with the estimated time being two days a month equaling $4,800 per year (2015 estimated cost). The added cost for water analyses is approximately $3,000 in the first year and $2,400 per year thereafter (2015 estimated cost). The total estimated cost is $7,800 in the first year and $7,200 per year thereafter. It is possible some costs were overlooked and/or new regulations have been added since 2015.

4.1.2 Professional assistance with operations

Separate from hiring a part-time water system operator to handle expanded regulatory requirements, managing and operating the water system requires extensive knowledge, time, and attention from our owner volunteers. Demands have increased as the water system ages and the necessity of proactive management commands greater respect. Owners are becoming older and the current level of volunteer effort cannot be counted on indefinitely. While volunteers will always be critical to many aspects of managing and operating the water system, tasking volunteers with a more limited set of responsibilities has become necessary.

The Water Committee, Water System Liaisons, and Board believe the highest priorities for the volunteer resource should be the activities surrounding how revenues are spent and reporting to owners and the Board. In contrast, some of the activities that involve month-to-month operation of the water system and/or involve substantial levels of trade expertise are aligned less well with volunteer labor, and should instead be contracted to a trained water system operator.

There is also practical value in providing a water system operator hands-on time to interact with and learn the High Lostine water system prior to when the system is required to operate under a community water system regulatory status. Of particular importance is advance knowledge of improvements that the operator will require or recommend in order to efficiently operate the High Lostine water system. These improvements can then be worked into the annual budgets over a number of years prior to the large permanent cost increase described in section 4.1.1.

For both of these reasons an operator should be hired to assist with (versus take over) routine operations, starting in 2020. The level of effort is tentatively estimated to be 20% of the effort thought to be necessary when the new regulatory status is reached; the level of effort may increase over time. This is approximately $1,000 per year based on the 2015 estimated cost in section 4.1.1.

4.2 Asset Replacements

Replacement of assets as they near the end of their expected lifetime is a critical and necessary part of the long-range financial planning for every utility. Some assets may be best managed through repair rather than replacement.

The asset replacement schedule (Table B) lists the estimated replacement year (column 4) and estimated replacement cost (column 5) for each asset. Estimated life expectancies (column 3) were taken from the Washington State Small Water System Management Program Guide and in a few instances from other engineering sources. The estimated replacement year (column 4) is the year installed (column 2) plus the estimated life expectancy (column 3). Estimated replacement costs (column 5) are in 2017 dollars and include materials and installation. Material costs were from catalogs or online sellers, and installation costs from actual bid estimates or extrapolation from past billed excavation work. To produce a schedule, the table is ordered by the estimated replacement year (column 4). Column 6 is the amount of the estimated replacement cost which is deemed appropriate to include in the 30-Year Plan based on guidance from J-U-B Engineers and the Oregon Association of Water Utilities, and unique characteristics of the HLOA water system. Explanatory footnotes follow the table.

Of the roughly $602,000 replacement cost of the water system's current physical assets (bottom of column 5), $144,000 is deemed appropriate to include in the 30-Year Plan (bottom of column 6).[iv]

The $144,000 is allocated as $55,000 funded by planned projects, $45,000 funded by unanticipated repairs, and (shaded in column 6) $44,000 funded by the capital reserve.

Table B. Asset Replacement Costs

Column 1 **Physical asset**	Column 2 **Year installed**	Column 3 **Estimated life expectancy**	Column 4 **Estimated replacement year**	Column 5 **Estimated cost (in 2017 dollars) to replace current assets**	Column 6 **Estimated cost (in 2017 dollars) of asset replacements included in 30-Year Plan. (Funded by)**
Mains (PVC)	1980	100 years	2020 (1)	$150,000	$8,000 (1) (planned project)
Connectors (PVC) from mains to meter boxes	1980	40-70 years	2020-2050	$36,000 (2)	$12,000 (2) (unanticipated repairs – spread over multiple years)
Fire-fighting hoses	2011	10 years for used (1½ inch), 20 years for new (1 inch)	2021 2031	$3,000 $2,000	$5,000 (two planned projects)
Submersible pump	2007	15 years	2022	$7,000 (soft-start)	$7,000 (planned project)
Well house	1996	30 years	2026	$12,000	$12,000 (capital reserve)
Remote-read low-lead service meters	2012-2019 and ongoing	15 years	2027-2034 and later	$18,000 (3)	$18,000 (3) (planned projects – spread over multiple years)
Valves	1980	50-75 years	2030-2055	$45,000 (4)	$15,000 (4) (unanticipated repairs – spread over multiple years)
Fire hydrants	1980	50-75 years	2030-2055	$54,000 (5)	$18,000 (5) (unanticipated repairs – spread over multiple years)
Telemetry	2010	20 years	2030	$20,000	$20,000 (capital reserve)
Concrete reservoir	1980	50-75 years	2030-2055	$200,000 (6)	$12,000 (6) (capital reserve)
Reservoir insulation	2011	20 years	2031	$6,000	$6,000 (planned project)

Full approval of water right		Entered as a reminder	2036	Cost and value not assigned	
Electrical line to pump	2007	30 years	2037	$3,000	$3,000 (planned project)
Well house plumbing	1991	50 years	2041	$5,000	$5,000 (planned project)
Flushing hydrants (two)	2017	25 years	2042	$3,000	$3,000 (planned project)
Well casing and screen	1991	50-75 years	2041-2066	$10,000	predominantly beyond Plan period
Power to reservoir	2016	40 years	2056	$10,000	beyond Plan period
Fire-fighting hardware	2011	50 years	2061	$3,000	beyond Plan period
Meter setters	2017 and ongoing	50 years	2067 and later	$15,000 (7)	beyond Plan period
Total				**$602,000** Replacement cost of current assets	**$144,000** Asset replacement costs to be included in 30-Year Plan

Table B footnotes:

(1) When the well was drilled in 1991, 2-inch diameter pipe was used to connect the well to the water system installed by the developer in 1980. To mitigate the multiple breaks that occurred in this section of 2-inch pipe, the pipe was replaced with 4-inch pipe in 2015. Repair of a break in the adjacent 4-inch pipe (caused by over-pressurization during a 2018 chlorination procedure) led to the observation that the pipe was highly fatigued. Although the static water pressure is nearly equal to the 160 psi rating of the pipe, J-U-B Engineers in La Grande stated this pressure was safely within the engineering standards and the observed fatigue was most likely a result of water hammer during the previous decades when the 2-inch pipe was present. J-U-B also stated it would be wise to replace the next 300 feet of pipe (extending to the junction with the Tamarack main) which is likely to be highly fatigued; estimated installation cost is $8,000 (pipe and couplers have been purchased). Finally, J-U-B stated it was reasonable to use a 100-year replacement lifetime in the other mains under the assumption that the pipe had been properly handled and bedded.

(2) Replacement cost is 18 connectors to meter boxes x $2,000. Connectors were installed with substandard pipe. Assume cumulative cost over life of the Plan is 33% of the replacement cost – this is for reinstallation of connectors to meter boxes (versus point repair of breaks) on the lower one-third of the system where pressures are highest. [Note: To date, breaks that have occurred at the junction with the meter box due to water hammer in the system or when torque is applied during operations performed at the meter box. Repairs of such breaks occur outside of this replacement schedule. A partial mitigation measure was the adoption of a new policy in 2016. The policy requires installation of meter setters whenever ground is opened at a meter box, for the purpose of strengthening the junction.]

(3) Replacement cost is 36 meters x ($250 purchase + $250 install).

(4) Replacement cost is 18 valves x ($500 purchase + $2,000 install). Assume cumulative repair cost is 33% of the replacement cost over life of the Plan, per guidance from the Oregon Association of Water Utilities.

(5) Replacement cost is 9 fire hydrants x ($4,000 purchase + $2,000 install). Assume cumulative repair cost is 33% of the replacement cost over life of the Plan, per guidance from the Oregon Association of Water Utilities.

(6) Purchase and installation of a liner to mitigate future leaks in reservoir. Replacement strategy assumes no catastrophic failure of the reservoir and no physical replacement of the reservoir. At some point in the Plan, small-volume water tanks (new asset) will be implemented for storage of potable water allowing the reservoir to be dedicated to fire-fighting. Guidance is per J-U-B Engineers and Oregon Association of Water Utilities.

(7) Replacement cost is 36 meter setters x ($150 purchase + $250 install).

4.3 Potential New Assets

Potential new assets are capital improvements projects that would be partially or fully funded from the capital reserve. Potential new assets were studied in depth in 2016 through 2018.[v] These assets are described in Sections 4.3.1 through 4.3.3.

4.3.1 Continuous disinfection

Why considered. Water sampling in 2016 identified bacterial contamination by a group of bacteria (total coliforms). Specific types of coliforms can cause disease. The state required disinfection of the reservoir, which was successful. The concern was that the state views batch disinfection as a band-aide rather than a full solution and will display diminishing tolerance with future total coliform-positive results, leading the state to require that the HLOA install an expensive continuous (year-round) disinfection system.

Estimated cost. Continuous disinfection is difficult and expensive to implement given the design of our water system. J-U-B Engineers provided a minimum-cost estimate of $32,000 for purchase and installation, which included two heated rodent-proof structures to house the equipment. In addition, the cost of base operations would increase about $1,000 to $3,000 per year for required sampling and analysis of chlorine residual and (possibly) chlorination byproducts.

Analysis. A mathematical model was constructed from historical records of water use, the control system pumping parameters, and volumes in the mains. The model predicted the most probable cause of the total coliform-positive samples was a residence time of hundreds of days in the reservoir. J-U-B Engineers agreed with that finding. J-U-B believed the state would not require continuous chlorination if 1) sampling results at the well remain total coliform-negative and 2) no *E. coli*-positive results are found in the system. Lastly, J-U-B stated those metrics were likely to be met in the future if the reservoir residence time was reduced to the industry standard of 3- 5 days.

Current status. The residence time has not been reduced to 3-5 days because doing so would make the reservoir more susceptible to inadvertent draining (resulting from persistent telemetry problems) and provide almost no water storage for fighting a fire. Instead, pumping parameters were changed to achieve a compromise that maintained some fire-fighting capacity and reduced the residence time to 14-21 days. Several other mitigation actions were also made: replacing several components of the telemetry system, more frequent flushing of dead-ends, and installation of flushing hydrants at the end of two legs of the system.

The probability this capital improvement project will be needed *soon is low*. The probability this capital improvement project will be needed *in the next decade is medium*. Because the residence time is still substandard there is a medium risk of total coliform-positive samples. If a pattern of total coliform-positive samples (or samples containing the disease agent *E. coli*) occur in the future, one solution is to reduce the residence time to 5-7 days in an attempt to circumvent a requirement for continuous disinfection; this would mean almost no water storage for fighting a fire. An alternative solution is a smaller-volume water tank (see section 4.3.2).

4.3.2 Small-volume water tank

Why considered. The 50,000 gallon concrete reservoir is oversized for the population served, leading to excessive water residence time and higher potential for bacterial contamination. Installing a 10,000 gallon water tank dedicated to providing household water provides two benefits.

- It reduces the residence time to the industry standard of 3-5 days. (Current residence time for the 50,000 gallon reservoir is 14-21 days, see section 4.3.1.)
- It allows the original concrete reservoir to be dedicated to water storage for fighting fires. This would provide several times more storage and allow low-volume sprinklers to be run for 1-2 hours in a wildfire situation.

Estimated cost. The Water Committee's estimate in 2017 was roughly $35,000 for purchase and installation, including a heated shed with a concrete floor. However, in early 2018 J-U-B Engineers considered all aspects of the project and provided a rough estimate of $61,000. The capital reserve fund contained only $13,000 at the time. DeCote Consulting in La Grande researched available low-interest loans from state and federal water agencies. The best loan that the HLOA water system qualified for would accrue $14,000 in interest on a 10-year $50,000 loan. Therefore, the project cost plus financing was roughly $75,000.

Analysis. J-U-B Engineers agreed with the two benefits of a 10,000 gallon water tank. However, the Water Committee felt that $75,000 was too expensive *at that time* given the low capital reserve and presence of multiple capital improvement projects that may become necessary. Instead, acute problems will be addressed as they occur in the future.

Current status. The probability this capital improvement project will be needed *soon is low*. The probability this capital improvement project will be needed *in the next decade is medium to high*. If a pattern of total coliform-positive samples or samples containing *E. coli* occur in the future, the state may not allow the HLOA adequate time to implement a water tank and instead require continuous disinfection, particularly if there were detections of *E. coli*. Consequently, a water tank capital improvement project may only be possible prior to the establishment of a pattern of positive samples.

4.3.3 Second well

Why considered. Water demand has exceeded the pumping capacity of the well when a hose has accidently been left running and during some water main breaks. This caused concern about the capacity of the well as more lots are developed with homes and more people become full-time residents.

Estimated cost. Cost includes drilling, well development, and connection to the existing water system. A successful well costs approximately $70,000 (in fractured bedrock aquifer, depth of about 300 feet) or approximately $50,000 (in valley aquifer, depth of 100-130 feet). Our current well is in a fractured bedrock aquifer. The valley aquifer may not extend to the north edge of the High Lostine. A dry (unsuccessful) well would cost approximately $30,000 less; a subsequent attempt at a successful well would add to the cost of an unsuccessful well.

Analysis. In 2016, future water demand was calculated from historical records of both the gallons pumped from the well per year and the number of full-time connections to the water system. Extrapolating the data to 2036 predicts that 70% of the lots will have full-time residents and the water demand will more than double (233% of the 2015/2016 demand).

A manual data collection program was launched in 2016 for the purpose of beginning to quantify the aquifer's resiliency to pumping and its seasonal variation. After one year of data, a report was delivered to the Board following review by J-U-B Engineers and a PhD hydrogeologist. The data indicated the well should be able to handle the High Lostine's projected water demand in 2036, with two caveats. First, data shows the aquifer supplying the well is recharged mainly in the spring by infiltration on the mountainside, indicating the well is likely to be impacted annually by variations in weather. Second, data was collected following the highest snowfall winter in several decades, suggesting a water shortage cannot be ruled out in dry years as the High Lostine grows. The engineer and hydrogeologist highly recommended continued monitoring and the installation of an automated data collection system in the well, which was completed in early 2019.

Current status. The probability this capital improvement project will be needed *soon is low*. The probability this capital improvement project will be needed *in the next decade is unknown*. The well's automated data collection system will provide a wealth of information for an improved assessment.

4.3.4 Summary of potential new assets

Table C summarizes information in sections 4.3.1 to 4.3.3. The table addresses each potential new asset in isolation, whereas the text below the table addresses the interaction between two of the assets.

Table C. Summary of Potential New Assets

Potential new asset	Estimated cost	Probability the capital improvement project will be needed *soon*	Probability the capital improvement project will be needed *in next decade*
Continuous disinfection	$32,000 minimum	Low	Medium
Small-volume water tank	$61,000 (does not include loan interest)	Low	Medium to high
Second well	$50,000 - $70,000	Low	Unknown (to be determined by ongoing data collection)

The first two assets in the table overlap with respect to providing alternate solutions to the residence time problem. For this reason, in the context of step 2 of section 5.1 below, one asset is rated as "medium-high" probability while the other asset defaults to a low probability.

5.0 Determining an Adequate Revenue Stream and Capital Reserve

Section 5.1 presents a 30-year cost and revenue schedule for the purpose of determining an adequate revenue stream and capital reserve to support the water system's long-term needs. Section 5.2 contains revenue recommendations and discusses risks.

5.1 30-Year Cost and Revenue Schedule

The purpose of this section is to explain the cost and revenue schedule on the next page. The schedule was constructed in four steps. Step 1 was entry of historical information on average expenditures per year from section 3.1. Step 2 was the addition of future water system costs from section 4. Step 3 was calculating the required annual capital reserve contribution. Step 4 was determining the projected revenue need by year.

Step 1: Historical expenditures

Historical expenditures for current base operations are $2,000 per year – this is entered in column 2 of the schedule.

Historical expenditures for planned projects average $5,000 per year – this is entered in column 3 of the schedule. This amount is several times the amount of planned projects in the forward-looking asset replacement table (section 4.2; total of $55,000 over 30 years or an average of about $2,000 per year), consistent with the fact that planned projects occur in multiple categories other than asset replacements.

Historical expenditures for repairs that are not planned projects average $4,000 per year, split roughly equally to unanticipated non-emergency repairs and emergency repairs – these are entered in columns 4 and 5 of the schedule. This amount is several times the amount for the three assets identified in the forward-looking asset replacement table (section 4.2; total of $45,000 over 30 years or an average of about $1,500 per year), and is consistent with the fact that repairs occur across all water system assets.

col. 1	col. 2	col. 3	col. 4	col. 5	col. 6	col. 7	col. 8	col. 9	col. 10	col. 11	col. 12
Water year	Base ops	Planned projects	Unanticip. repairs	Emergency repair contrib.	Total operating budget	Capital reserve contrib. (for cap. improve. projects)	Total budget [& revenue need]	Projected balance in capital reserve	Cap. improve. project by year	Cap. improve. project name	Revenue need adjusted for inflation
								start $15,000			
2019/20	$2,000	$5,000	$2,000	$2,000	$11,000	$9,000	$20,000	$24,000			$20,600
2020/21	$3,000	$5,000	$2,000	$2,000	$12,000	$9,000	$21,000	$33,000			$22,260
2021/22	$3,000	$5,000	$2,000	$2,000	$12,000	$9,000	$21,000	$42,000			$22,890
2022/23	$3,000	$5,000	$2,000	$2,000	$12,000	$9,000	$21,000	$51,000			$23,520
2023/24	$11,000	$5,000	$2,000	$2,000	$20,000	$9,000	$29,000	$60,000			$33,350
2024/25	$11,000	$5,000	$2,000	$2,000	$20,000	$9,000	$29,000	$69,000			$34,220
2025/26	$11,000	$5,000	$2,000	$2,000	$20,000	$9,000	$29,000	$78,000			$35,090
2026/27	$11,000	$5,000	$2,000	$2,000	$20,000	$9,000	$29,000	**$75,000**	$12,000	Well house	$35,960
2027/28	$11,000	$5,000	$2,000	$2,000	$20,000	$9,000	$29,000	$84,000			$36,830
2028/29	$11,000	$5,000	$2,000	$2,000	$20,000	$9,000	$29,000	**$43,000**	$50,000	Generic CIP #1	$37,700
2029/30	$11,000	$5,000	$2,000	$2,000	$20,000	$9,000	$29,000	$52,000			$38,570
2030/31	$11,000	$5,000	$2,000	$2,000	$20,000	$9,000	$29,000	**$41,000**	$20,000	Telemetry system	$39,440
2031/32	$11,000	$5,000	$2,000	$2,000	$20,000	$9,000	$29,000	$50,000			$40,310
2032/33	$11,000	$5,000	$2,000	$2,000	$20,000	$9,000	$29,000	$59,000			$41,180
2033/34	$11,000	$5,000	$2,000	$2,000	$20,000	$9,000	$29,000	$68,000			$42,050
2034/35	$11,000	$5,000	$2,000	$2,000	$20,000	$9,000	$29,000	$77,000			$42,920
2035/36	$11,000	$5,000	$2,000	$2,000	$20,000	$9,000	$29,000	$86,000			$43,790
2036/37	$11,000	$5,000	$2,000	$2,000	$20,000	$9,000	$29,000	$95,000			$44,660
2037/38	$11,000	$5,000	$2,000	$2,000	$20,000	$9,000	$29,000	$104,000			$45,530
2038/39	$11,000	$5,000	$2,000	$2,000	$20,000	$9,000	$29,000	**$63,000**	$50,000	Generic CIP #2	$46,400
2039/40	$11,000	$5,000	$2,000	$2,000	$20,000	$9,000	$29,000	$72,000			$47,270
2040/41	$11,000	$5,000	$2,000	$2,000	$20,000	$9,000	$29,000	**$69,000**	$12,000	Reservoir liner	$48,140
2041/42	$11,000	$5,000	$2,000	$2,000	$20,000	$9,000	$29,000	$78,000			$49,010
2042/43	$11,000	$5,000	$2,000	$2,000	$20,000	$9,000	$29,000	$87,000			$49,880
2043/44	$11,000	$5,000	$2,000	$2,000	$20,000	$9,000	$29,000	$96,000			$50,750
2044/45	$11,000	$5,000	$2,000	$2,000	$20,000	$9,000	$29,000	$105,000			$51,620
2045/46	$11,000	$5,000	$2,000	$2,000	$20,000	$9,000	$29,000	$114,000			$52,490
2046/47	$11,000	$5,000	$2,000	$2,000	$20,000	$9,000	$29,000	$123,000			$53,360
2047/48	$11,000	$5,000	$2,000	$2,000	$20,000	$9,000	$29,000	$132,000			$54,230
2048/49	$11,000	$5,000	$2,000	$2,000	$20,000	$9,000	$29,000	$141,000			$55,100
Totals	**$297,000**	**$150,000**	**$60,000**	**$60,000**	**$567,000**	**$270,000**	**$837,000**		**$144,000**		

The total operating budget (column 6) is the sum of columns 2 through 5.

Step 2: Add future costs

The change in regulatory status (section 4.1.1) including adjustment for inflation from the 2015 estimate adds roughly $8,000 per year; the year is uncertain but is projected to be 2023 in the schedule. Professional assistance on the operations side of managing the water system (section 4.1.2) adds $1,000 per year starting in 2020. These costs are added to the $2,000 already present in column 2 of the schedule.

The capital reserve funds capital improvement projects (CIPs). The CIP costs and names are shown in columns 10 and 11 of the schedule. The schedule contains $44,000 of CIPs from the asset replacement table (shaded text in column 6 of the table in section 4.2) and $100,000 for CIPs that would be new assets. As summarized in section 4.3.4, the probabilities for the three potential new assets becoming a CIP in the next decade are low, medium-high, and unknown. The average cost for each of the three potential new assets is roughly $50,000. As of 2018 a responsible estimate is that two of the three potential new assets will be needed. (The need might be reduced to one new asset in the future if it's concluded a second well is likely to be unnecessary, although the risks presented in section 5.2 remain.) Because it is unknown which potential new assets will be needed, the CIPs are entered in the schedule as "generic CIP #1" and "generic CIP #2" at $50,000 each. It is also unknown when the two CIPs will be needed but a responsible estimate, which is entered in the schedule, is one-third and two-thirds through the 30-year plan period.

Step 3: Capital reserve contribution

To calculate the required annual capital reserve contribution, the capital reserve balance at the end of water year 2018/19 (approximately $15,000) was entered at the top of column 9. Trials with different annual capital reserve contributions were conducted by entering a constant value in column 7. The capital reserve balance (column 9) increases each year by the capital reserve contribution (column 7) until the schedule shows a CIP is reached, at which time the appropriate subtraction is made. In each trial, the capital reserve balance over time was evaluated against the guidance of not using more than one-half of the available capital reserve for any given CIP (section 3.2). The trials showed that an annual contribution of $9,000 (entered in column 7 of the schedule) was the lowest value that approximates that guidance. That is, as shown in column 9, generic CIP #1 in water year 2028/29 falls somewhat short of the guidance ($84,000+$9,000 = $93,000 capital reserve; subtracting the $50,000 expenditure leaves a capital reserve of $43,000) but generic CIP #2 in water year 2038/39 meets the guidance ($104,000+$9,000 = $113,000 capital reserve; subtracting the $50,000 expenditure leaves a capital reserve of $63,000). The three smaller CIPs also meet the guidance.

Note that CIPs in columns 10 and 11 are paid wholly from the capital reserve (see section 5.2, recommendation #1, item 4). A more loan-reliant financing strategy may be adopted in the future; this would reduce the required size of the capital reserve but transfer principal and interest costs to the operating budget. Regardless of whether or not a more loan-reliant strategy is adopted, a loan may be required for an expensive CIP that is not present in the schedule, or for a CIP that was much more costly than – or occurred much earlier than – was specified in the schedule (see section 5.2, recommendation #1, items 2 and 3).

The projected balance in the capital reserve (column 9) after the 2038 withdrawal accumulates to $141,000 by 2048. The accumulation in the last 5 years may appear excessive. On the other hand, anticipating the capital reserve balance this far into the future is likely to be inaccurate.

Step 4: Revenue need

The revenue need (column 8) is the sum of the operating budget (column 6) and the capital reserve contribution (column 7). The revenue need summed over the 30 years is about $840,000 in 2017 dollars.

Values in the cost and revenue schedule are in 2017 dollars except column 12. Column 12 is the column 8 revenue need adjusted for an assumed average annual inflation rate of 3% starting in 2019. The increasing deviation with time between columns 8 and 12 demonstrates the dramatic impact of inflation. Therefore, to provide adequate revenue to cover future expenditures, an inflation adjustment must be incorporated into the annual revenue requests.

Annual budgets will deviate somewhat from the schedule due to the pace and cost of selected planned projects, but should average out over the years. Annual budgets will also deviate from the schedule if a loan repayment or grant occurs, if the community water system status is reached earlier or later than in the schedule, and when a change is made to the year a CIP is funded. Finally, deviation may occur if it's concluded a second well is likely to be unnecessary. However, the 30-year schedule is the best available projection; it provides owners with a more accurate and predictable picture of revenue needs, and thus their future annual assessments. A retrospective analysis of expenses and revenue should be conducted every 5 years to evaluate if the capital reserve is substantially falling behind or getting ahead of the schedule.

5.2 Recommendations and Risks

This section describes four recommendations from the Water Committee.

Recommendation #1

To provide an adequate revenue stream and capital reserve to support the water system's long-term needs the Water Committee recommends an annual capital reserve contribution (before inflation) of $9,000, an increase of $2,000 over the contribution in water year 2018/19. This level of contribution is believed to reflect a reasonable and appropriate risk tolerance. If less risk is desired, the capital reserve contribution should be increased. The recommendation comes with the following caveats (risks).

1. The schedule assumes the cost of past maintenance and repairs is a good predictor of the future, the estimated life expectancies are appropriate for the HLOA water system, and the estimated costs for a certified water operator and anticipated capital improvements projects are reasonably accurate.

2. Three possible repairs have been omitted from the scheduled costs analysis:
- Major repair to the reservoir
- Replacement of mains
- Replacement of pipe that connects mains to meter boxes on the upper two-thirds of the system.

These failures are currently (2019) considered somewhat unlikely, but could occur. These events represent the greatest challenge the water system could face and, if an event occurs, a large increase in revenue would be required.

3. Situations may arise that result in a failure to meet the guideline of using no more than approximately one-half of the available capital reserve for a given capital improvement project. For example, the guideline would not be met if the first capital improvement project happened to be a $70,000 second well, or if the capital improvement project scheduled for either 2028 or 2038 was required earlier. If such events occur, they would also represent a great challenge and revenue would have to be increased.

4. Interest payments on a loan(s) would increase the revenue need. Loans are not currently (2019) included in the cost and revenue schedule due to uncertainties regarding collateral and other qualifying criteria, probability of success, future financial terms, and trade-offs involved in relying solely on a capital reserve versus a more loan-reliant financing strategy.

Recommendation #2

If events in items 2 or 3 above occur, additional revenue sources are higher assessments, loans, grants, or some combination thereof. Obtaining grants and loans is often contingent upon an available match from the capital reserve. Grant awards would decrease the revenue need, but grant opportunities are limited and the HLOA may not qualify for some grants due to per capita income criteria. Loan and grant opportunities from drinking water agencies are much broader and more financially favorable after the water system becomes large enough to be regulated as a "community water system".

For these reasons, upon reaching the community water system status, the Board should consider hiring an expert(s) to identify the probability of successfully obtaining different grants, locate the best loan or loan-grant match opportunities for the identified capital investment projects, and recommend the best combination(s) of higher assessments, loans, and grants to fund the long-term needs of the water system. Such information might allow the justification of a smaller capital reserve or revenue stream at some point in the future.

Recommendation #3

The cost and revenue schedule is in 2017 dollars. To provide adequate revenue to cover future expenditures, annual expenditure and revenue requests are to be adjusted for inflation.

Recommendation #4

A retrospective analysis of expenditures and revenue is to be conducted every 5 years and after a major financial change, to evaluate if the capital reserve is substantially falling behind or getting ahead of the cost and revenue schedule. The analysis should document any significant changes in expenses or revenue, any resulting adjustment made to the schedule, and any change in recommendations. The information should be appended to the original or revised 30-Year Plan, and serves as an important historical record for future decision-making.

6.0 Summary and Conclusions

6.1 Summary

Physical improvements in the past, and the financial support to achieve them, have corrected a large number of deficiencies and moved the water system to a much firmer position. While the discovery of deficiencies has not abated in recent years, there is reason to believe most major deficiencies have now been identified and addressed in the Plan.

The water system account has developed a robust financial structure that can handle unanticipated events and emergencies while protecting the capital reserve. Owners receive thorough explanations of each annual budget and detailed explanations of each year's expenditures.

That being said, financial challenges remain because our system is growing into a new regulatory category, relies excessively on volunteers, has deficiencies relative to many municipal systems, and is aging. A detailed analysis was conducted of past expenditures and future water system needs and costs. The analysis allowed the assembly of a 30-year cost and revenue schedule. The schedule provides owners with a more accurate and predictable picture of revenue needs, and thus their future annual assessments.

The good news is the schedule indicates the assessment level announced in spring 2018 is sufficient (excluding inflation) to support about 80% of the cost of the capital improvement projects anticipated over the 30-year period of the Plan.

Additional revenue is needed for two purposes. A permanent $2,000 per year increase in the capital reserve contribution is recommended to supplement the anticipated capital improvement projects. Important risks inherent to the recommendation were identified. Second, the operating budget will need to be increased by about $9,000 per year: $1,000 for professional assistance on the operations side of managing the water system (starting in 2020) and $8,000 when the water system comes under a new regulatory status (projected in 2023). It is possible that both parts of the increase in the operating budget are underestimates.

Other recommendations were a retrospective analysis should be conducted every 5 years or after a major financial change to compare historical expenditures and revenues against the cost and revenue schedule, and an inflation adjustment must be incorporated into the annual expenditure and revenue requests.

6.2 Conclusions for Board Action

1) Development of this Plan has repeatedly underscored that continual investment in the water system is absolutely essential. While assessments have been increasing in recent years to address system deficiencies and build a formative capital reserve, additional revenue is necessary to supplement the funding of anticipated capital improvements projects, and to build the capital reserve to a level that responsibly protects the water system and functions to protect owners from large assessments in crisis situations. It is the Association's responsibility to ensure revenue is adequate to support the water system asset that is fundamental to the value of owner's lots. The annual capital reserve contribution should be increased by $2,000 as soon as possible.

2) Planning should be pursued in 2019 for professional assistance on the operations side of managing the water system. Responsibilities and contract terms (for example, hourly rate and a time reporting system) need to be written for assistance beginning in water year 2020/21.

3) The Plan was developed through multiple iterations over a three year period with input from engineering, hydrogeology, and water utility professionals; many meetings of the Water Committee; multiple Board meeting discussions; and editing expertise from several owners. Barring a need for additional changes, the Board of Directors should approve the High Lostine Water System 30-Year Plan (2018-2048) and make it available to all owners.

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[i] The emergency repair reserve is a financial binning and tracking process used to accumulate a pool of money and pay for emergency repairs. If funds for emergency repairs were tracked in the operating budget there would be a large carryover of unused funds in most years and high emergency repair expenses in a few other years, causing large fluctuations and complicating both reporting and understanding of the operating budget balance. Therefore funds for emergency repairs are binned and monitored separately from the operating budget.

[ii] State law requires the transfer to be considered a loan from the capital reserve; this transfer must be quickly repaid from the operating revenues, which will likely require a special assessment charged to the membership. In the case of a very expensive emergency, a commercial, government, private or non-profit loan may be needed to pay all or some of the bill; if this occurs, the loan repayment will become part of the operating budget. The transactions described in this paragraph are not shown in Figure A.

[iii] The Board's allocation decisions are based on their best assessment of the expectations of the membership, fairness, management goals (e.g. conservation, reservoir turnover, fire-fighting capacity), utility and regulatory guidance, comparable systems, desire for stability, and historical experience.

[iv] Justification for the reduction from $602,000 to $144,000 is as follows: a reduction of $180,000 due to some costs falling beyond the 30-Year Plan period, a reduction of $188,000 due to not replacing the concrete reservoir, and a reduction of $90,000 due to repairing assets (such as connectors, valves, fire hydrants, etc.) as failures occur rather than replacing the asset.

[v] In spring 2017 J-U-B Engineers in La Grande was hired to review a draft of the 30-Year Plan with emphasis on potential new assets and to issue a written report to the HLOA. Sections 4.3.1 through 4.3.3 incorporate selected information from that written report.