MILL CREEK REPORT

A Report Addressing
Improvements to the City of Walla Walla’s Municipal Water Supply System
In Association with
Increasing Flows of Mill Creek for Salmonids and Other Native Aquatic Life

Prepared by the
City of Walla Walla
In collaboration with the
Confederated Tribes of the Umatilla Indian Reservation (CTUIR) and the
Washington State Department of Fish and Wildlife (WDF&W)

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I. INTRODUCTION

Encouragement of intergovernmental cooperation on issues of regional significance is a sound and well-established public policy fundamental. That which follows is founded on this fundamental.

This Report is rooted in a 2016 Washington State Department of Ecology (DOE) Reservoir Permit issued to the City of Walla Walla (City) which authorizes the City, in the operation of its water supply system, to store underground its municipal use water diverted from Mill Creek. This document, permit-mandated for City preparation, is the product of a cooperative joint endeavor of three government entities with different origins and constituencies, namely the (1) Confederated Tribes of the Umatilla Indian Reservation (CTUIR), (2) Washington State Department of Fish and Wildlife (WDFW), and (3) the City. Over the past two years these three entities, through a Work Group established by the City, have participated in the analysis of various physical projects and management approaches to the use of waters of Mill Creek that, alone or in combination, have the potential to both improve (1) the capability of the City’s municipal water supply system and (2) in association with that capability, the flows of the Creek during critical low flow periods for salmonids and other native aquatic life.

The Report concludes with the following recommendations:

(1) Pursuing various physical projects and water management programs for near and long-term implementation; and

(2) Continuing a joint cooperative Mill Creek enhancement endeavor by the three governments; and

(3) Endorsing the future use of a similar joint discussion format by the three pertaining to any subjects of a regional nature in which the entities have interests.

II. MILL CREEK AND ITS HISTORIC RELATIONSHIP WITH THE CITY, CTUIR AND WDFW

A. Mill Creek

1. Location

Mill Creek is an interstate stream whose headwater tributaries originate in the Blue Mountains of both Washington and Oregon. The mainstem of Mill Creek originates in Washington, flows into
Oregon and then re-enters Washington where it remains until it ends with its confluence with the Walla Walla River a short distance west of the City. Mill Creek extends upstream about 40 miles from that confluence to the approximately 5,000’ crest of the Blue Mountains in the Umatilla National Forest. The Mill Creek watershed contributes approximately 15 percent of the Walla Walla River sub-basin’s total yearly runoff volume. The City’s Mill Creek municipal watershed is located approximately one-third within Oregon and two-thirds within Washington and is owned primarily by the federal government and by the City. Located in the headwaters of the Blue Mountains, it is an area of approximately 36 square miles and is a protected roadless area that is closed to the general public. It was established as the City’s water supply by the U.S. Department of Agriculture in 1918.

2. Maps
A map, attached marked Appendix A, sets forth among other features the City’s Mill Creek drinking water watershed and the stream’s mainstem and its significant tributaries and distributaries. In addition, it shows dams and other instream structures, as well as major elements of the City’s municipal water supply system, i.e. “closed” watershed portion, diversion works, pipeline, treatment plant and service area. The City wells are shown on Appendix B, the ASR block map.

B. Mill Creek and Its Historic Relationships of the City, CTUIR and WDFW
The following describes the foundational interests in Mill Creek of the three entities:

1. City of Walla Walla
The City’s interest in Mill Creek centers on its municipal water supply and the Creek’s physical-aesthetic condition.\(^1\) Since the mid-1860s, the Creek has been the primary source of its water supply i.e. derived from the “closed’ upper-reaches portion of the Creek’s watershed\(^2\). The Creek flows for a six-mile reach within the City including a portion through the center of its downtown.

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\(^1\) The City was incorporated on January 11, 1862

\(^2\) The City derives its water supply by a diversion from Mill Creek located in Oregon approximately four miles upstream of Kookooskie, Washington. The diversion is authorized by an 1866 priority water right evidenced by an Oregon law based Certificate No. 13276. See also Washington Certificate S3-28051J issued by predecessor to DOE pursuant to a Walla Walla County Superior Court decree which confirmed the City’s aforesaid 1866 priority right (Adjudicated Certificate No. 51). The City is also, by two 2001 priority Oregon (1) Certificate 87647 and (2) Permit S-54483, authorized to divert at the same location (in association with its operation of the ASR reservoir).
2. CTUIR

Mill Creek flows in its entirety through the aboriginal territories of the tribes of the CTUIR. The CTUIR’s interest in the Creek are founded on the treaty of June 9, 1855, negotiated between representatives of the United States and representatives of the Walla Walla, Cayuse, and Umatilla tribes on the banks of Mill Creek near what is now the center of the City.\(^3\) This Treaty established the boundaries of the Umatilla Indian Reservation and reserved for tribal members the right to fish “including at usual and accustomed places,” as well as to hunt, gather food, and pasture stock, on open and unclaimed lands.\(^4\) Mill Creek is currently a minor contributor for salmon and steelhead production in the Walla Walla Basin (less than 10% of total) but it has the potential to produce approximately five times above current levels if lower Mill Creek instream flow and channel conditions are improved.

3. WDFW

WDFW’s interest in Mill Creek is based on the authorities provided in Title 77 RCW. A section of that Title, RCW 77.04.012 mandates WDFW to “…preserve, protect, perpetuate and manage the wildlife and fin fish, game fish and shell fish in state waters....” Amplifying on that mandate, WDFW’s states its mission to be “…to preserve, protect, and perpetuate fish, wildlife and ecosystems while providing sustainable fish and wildlife, recreational and commercial opportunities.” This mission is to be accomplished through pursuit of the following goals:

(1) Conserve and protect native fish and wildlife;

(2) Provide sustainable fishing, hunting, and other wildlife-related recreational and commercial experiences; and

(3) Promote a healthy economy, protect community character, maintain an overall high quality of life, and deliver high quality customer service.

\(^3\) 12 Stat. 945, see Section II, C infra. Ratified by Congress, March 8, 1859

\(^4\) Id., Article 1
C. City of Walla Walla’s Reservoir Permit No. 3R-50256 - General Description

1. General Description

On June 2, 2016, the Washington State Department of Ecology (WSDOE) issued to the City of Walla Walla (City) a document entitled Reservoir Permit No. 3R-30526. This permit authorizes the City to store water diverted from Mill Creek, the City’s water supply source, in an underground “ASR” reservoir as an additional physical element of the City’s municipal water supply system. The reservoir, composed of three inter-related “fault blocks” named fault blocks one, two and three, has an approved storage capacity of 11,750 acre-feet. However, storage and withdrawal by the City is presently limited to Blocks 1 and 2, in the amount of 6,500 acre-feet. Further, because of the City’s existing well storage/withdrawal capabilities, the City is limited in withdrawals to 2,310 acre-feet a year within the two blocks. See page 2 of Appendix D (ASR permit).

2. Report Provision

A provision of the City’s Reservoir Permit provides for the City, working in a collaborative Work Group with CTUIR and WDFW, to develop within a two-year time frame a comprehensive report addressing various near and long-term issues associated with improving the City’s municipal water supply system in conjunction with enhancing the flows and other ecological functions of Mill Creek and its tributaries and distributaries. The five subject areas mandated to be addressed in the Report, quoting from the ASR permit, are:

a) Define near- and long-term municipal water supply and fishery and other instream flow use goals;  
b) Identify existing issues inhibiting accomplishment of water supply goals;  
c) Identify, analyze, and recommend near-term options, using existing infrastructure, to augment instream flows during critical timeframes for fish

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5 See RCW 90.03.370, WSDOE’s authority to issue the permit. See also Appendix D attached -- a copy of Reservoir Permit No. 3R-50256.
6 “ASR” is an acronym for the words “aquifer storage and recovery.” See RCW 90.03.370(3)
7 See the Reservoir Permit’s carry-over paragraph on pages 7-8. This paragraph was included in the Reservoir Permit in the context of concluding an appeal of the WSDOE’s permit-issuing action filed by the CTUIR with Washington State Pollution Control Hearings Board (PCHB). See Confederated Tribes of the Umatilla Indian Reservation v. State of Washington, Department of Ecology and City of Walla Walla, PCHB No. 15-121-STIPULATION AND JOINT MOTION FOR ORDER OF DISMISSAL, dated March 9, 2016.
while maintaining and potentially enhancing the City’s ability to meet water supply goals;
d) Identify, analyze, and recommend long-term infrastructure and management options to augment instream flows during critical timeframes for fish while maintaining and potentially enhancing the City’s ability to meet water supply goals; and
e) Identify actions necessary to implement any options recommended for pursuit.

D. **Mill Creek Work Group**

1. **Establishment**

This Report has been prepared by the City, working in close cooperation with CTUIR and WDFW, to satisfy the Permit’s report development requirement provision. That preparation has taken place in the context of the deliberations of a Mill Creek Work Group (MCWG or Work Group), formed by the City in accordance with a direction contained in the provision, consisting of representatives of the CTUIR, WDFW, and the City.

2. **Activities**

Over the past months, members of the MCWG have deliberated on the five subject areas required by the City’s reservoir permit to be addressed.8 These deliberations included monthly meetings of the MCWG held between August 2016 and May 2018. In addition, numerous individual communications have taken place between members of the MCWG and with non-members. As a result of these deliberations, this report recommends the following general project types designed to benefit both municipal and fisheries objectives namely:

   a) Aquifer Storage and Recovery (ASR), and
   b) Water Use and Conveyance Efficiency

The group was also informed of other ongoing activities related to furthering the enhancement of the Walla Walla River Basin, including the Mill Creek Watershed, which may have complementary outcomes to the projects recommended for pursuit in this Report. These activities include:

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8 See Section I.c.ii., pages 7-8, *supra*. The members of the Work Group were for the (1) Tribe-Gary James, David Haire, Anton Chiono, Chris Marks (2) WDFW-Mark Grandstaff, and (3) City-Frank Nicholson, Tom Krebs, Charles Roe
E. **Report’s Objectives – Summarized**

As previously described, the primary objective of this document is to identify potential infrastructure upgrades to the City’s municipal water supply system and potential modifications to its management that provide benefits to both the (1) municipal water supply system and (2) flow increases within various reaches of Mill Creek. The Report concludes by identifying actions necessary to implement recommended changes to the system through physical additions and administrative modifications designed to achieve that objective. An additional important conclusion element of this Report is that it recommends it be relied upon as a guidance foundation for continued joint enterprise activities between the parties in the pursuit of the potential development, funding and implementation of projects that benefit both municipal water use and instream flows for fish and other aquatic life and aesthetics.

III. **THE REPORT - ADDRESSING THE FIVE MANDATED SUBJECT AREAS**

Informed by the Mill Creek Work Group deliberations and other sources, the five mandated report subject areas are now addressed. These responses are contained in the following “Subject Area” subsections A-E.

A. **SUBJECT AREA 1 – Define near – and long-term (1) municipal water supply and (2) fishery and other instream flow use goals.**

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9 For an expanded description of these six activities, see Appendix H.
1. **City**
   
   **a. Long Term Goals**

   In relation to municipal water supply, the City’s long-term goals for Mill Creek are:

   1) Insuring sufficient amounts of water derived from Mill Creek are available on a continuous basis to satisfy in full the needs of its water users with a stable, high-quality supply;

   2) Regarding instream beneficial use flow needs for fish and other aquatic life, when in accord with the municipal water supply goal of the immediately preceding subsection and the economic well-being of the City and surrounding Mill Creek basin area, achieving flows of a suitable quantity and quality for the Creek in amounts needed to ensure that sufficient stocks of native fish and other native aquatic life are protected in a survival condition from elimination; and

   3) For other values derived from upgrading the Creek’s condition, e.g. recreational and aesthetic uses, improving the condition of the beds, banks and adjacent uplands of the Creek’s lower reach.

   **b. Near Term Goals**

   The near-term goals, i.e. during the next ten years, center on the pursuit of various physical improvements and administrative changes to the City’s municipal supply system as steps leading to the achievement of the City’s long-term goals.

2. **CTUIR**

   **a. Long Term Goals**

   In 2007, the CTUIR Department of Natural Resources (DNR) adopted a First Foods focused Mission, stated as follows:

   “To protect, restore, and enhance the First Foods – water, salmon, deer, cous, and huckleberry – for the perpetual cultural, economic, and sovereign benefit of the CTUIR. We will accomplish this utilizing traditional ecological and cultural knowledge and science to inform: 1) population and habitat management goals and actions; and 2) natural resource policies and regulatory mechanisms”
The CTUIR considers its First Foods statement to be the foundation of its long-term goals for Mill Creek, i.e. providing the minimum ecological products necessary to sustain CTUIR culture, and to provide a diverse table setting of native foods for the tribal community (see Appendix G for additional CTUIR First Food and River Vision information). The CTUIR’s River Vision facilitates the sustained production of First Foods by establishing a vision for the desired ecological characteristics of stream water quality and resource management. The five key ecological characteristics (or touchstones) of functional streams that are considered by the River Vision to be vital in the management and restoration of river ecosystems, and which are tied directly to the CTUIR’s First Food Mission, include (1) hydrology, (2) geomorphology, (3) habitat and network connectivity, (4) riparian vegetation, and (5) riverine biotic communities. This report centers on the first touchstone, hydrology (water), an essential element for fisheries resources enhancement and the exercise of treaty fishing rights. It is anticipated that the near and long-term water projects identified in this report will serve as the foundation for a future collaborative relationship between the City and CTUIR.

With this foundational backdrop, the CTUIR is striving over the long-term to achieve a healthy and ecologically functioning watershed that adequately addresses all River Vision touchstones. Thus, the hydrology touchstone (water quantity and quality) is most pertinent to this report. As to flows for Mill Creek the targets are as follows:

<table>
<thead>
<tr>
<th>Reach</th>
<th>CTUIR’s Target Minimum flow (cfs) by month</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Oct*</td>
</tr>
<tr>
<td>WW Diversion to Blue Creek</td>
<td>43</td>
</tr>
<tr>
<td>Blue Creek to Confluence</td>
<td>46</td>
</tr>
</tbody>
</table>

* Or natural inflow, whichever is less

b. Near Term Goals

The CTUIR’s near-term goals include strengthening relations with water resource co-managers and moving towards more multi-objective resource management. Stronger relations and more comprehensive management is expected to help protect existing instream flows from further diminishment and degradation while working towards the long-term goals and will help continue incremental progress towards restoring Mill Creek flows and ecological functions.

3. WDFW

a. Long-Term Goals

WDFW recognizes as the first priority, upstream fish passage through the flood channel as there are 60 miles of moderate to good spawning and rearing habitat for salmonids in the Creek upstream. Adult salmonids have a high biological value for their populations, simply put, they have survived the rigors of life and have returned to reproduce. Therefore, restoring passage is the most important thing we can do for those fish populations.

In 2007, WDFW applied for the first grant to assess fish passage barriers in the Mill Creek Flood Control Channel. Due to the function and complexities of the flood control channel, the original objectives for the Mill Creek Fish Passage Project was to improve fish passage, while not reducing channel capacity for floods and maintaining access for Walla Walla County Flood District maintenance crews that annually remove debris from the flood control channel. Providing upstream passage is critically important to the survival of ESA Threatened Mid-Columbia Steelhead and Bull Trout populations found in Mill Creek.

WDFW views upstream fish passage restoration as an immediate goal, however, the scope and severity of the passage issue in Mill Creek qualify it for both near-term and long-term goals for the agency. In addition to upstream passage, long-term efforts also must be made to increase water quantity and quality in Mill Creek. Increased flows in Mill Creek will improve water quality, habitat availability, and fish survival during warm summer months and cold winter months. Finally, stream channel restoration will provide more complex habitat and opportunities for fish and wildlife that rely on Mill Creek.
b. Near-Term Goals

Near-term goals for WDFW are to build partnerships with local stakeholders that will improve conditions in Mill Creek and the Walla Walla River. The Department would like to work more closely with Walla Walla County and the Cities of Walla Walla and College Place to increase “critical areas” adjacent to the Mill Creek Flood Control Channel for future projects that will improve flood protection, river function, and recreation in and around Mill Creek.

B. SUBJECT AREA 2 – Identify existing issues inhibiting accomplishment of water supply goals.

1. City Views

The City’s municipal water supply goals, including enhancement of Mill Creek during critical flow periods, are inhibited from accomplishment by a variety of factors. Among the most prominent are the following:

   a) Lack of adequate implementation funds.

   Most, if not all, of the most promising projects are expensive. This lack of funds either precludes or slows down implementation of physical solutions all of which implicate the enhancement of Mill Creek’s condition.

   b) Government regulations.

   State, Federal and local government permits and approvals are often required for implementation of physical solutions. The processes leading to their issuance takes time, far too often of extraordinary lengths. In many instances, significant financial costs are incurred by the applicant, e.g., the preparation of scientific studies and statutory compliance analysis to support permit-approval applications.

   c) Bi-State Issues.

   A further complication of import arises because Mill Creek is an interstate stream. This brings into play the applicability of differing governmental statutes and rules relating to the administration of the stream that often hinder the achievement of municipal water supply and stream flow enhancement goals.
2. CTUIR Views

The CTUIR’s water supply goals are largely inhibited by a lack of willingness and ability of local, state, and federal co-managers to move away from the single-objective water supply management approaches and the legacy infrastructure resulting from that approach. Instream water rights necessary to support the CTUIR’s First Foods and related Treaty rights were not considered when the water supplies of Mill Creek, its tributaries, and hydraulically connected groundwater were allocated. Modifications to the floodplain and stream habitat were also done without considering impacts to fisheries resources in Mill Creek. Floodplain and instream habitat modifications have also negatively impacted the amount and quality of flows.

The combination of instream flow reduction and floodplain development/stream channelization, and a dam blocking migration resulted in the extirpation of spring Chinook salmon in the Walla Walla Basin and major reduction of steelhead and bull trout which are listed as threatened under the Endangered Species Act. Current fish restoration efforts have begun rebuilding these populations. Primary limiting factors inhibiting achievement of CTUIR’s instream flow goals include the following:

a) Inadequate Mill Creek flows during critical timeframes for fish.

Beginning in the mid-1800’s, with the arrival of the non-native settlers, the natural flows of the middle and lower reaches of Mill Creek were significantly decreased primarily due to diversions for agricultural and municipal purposes. Many of these diversions, especially in low-flow periods, were detrimental to the stream’s aquatic and adjacent riparian life, as well as various aesthetic values. Indeed, in some years, the stream’s flow has been so diminished that flows have ceased in portions of its reaches.11

The 2016 NOAA Mid-Columbia Steelhead 5-yr Status Review Report concluded that the greatest opportunity to advance steelhead recovery in the Walla Walla River would be to increase flows, reduce water temperatures and remove/improve passage barriers.12 Among the highest priority areas cited therein are lower Mill Creek and Bennington Dam.

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11 See Lower Mill Creek Habitat and Passage Assessment, CTUIR
During summer months (June through October), seasonal low flows in lower Mill Creek are subject to many withdrawals for municipal consumption, cropland irrigation, livestock, and water storage. These impacts have altered the hydrologic regime, severely reducing the amount of water flowing through Mill Creek and leading to physical and temperature barriers to fish passage and rearing. At the “Division Works” Dam, most of the flows are diverted away from Mill Creek to Yellowhawk and Garrison Creeks. The flow in Mill Creek below the Division Works Dam in Mill Creek is often so low during the summer (mean monthly discharge from July to October is 3.7 cfs) that it cannot sustain the minimum velocities and depths necessary to support any life stages for cold water fish species.\(^\text{13}\)

Critical time frames for salmon, steelhead, bull trout and lamprey include:

1. Salmonid passage/migration – spring through July; and fall beginning in October;
2. Salmonid rearing – throughout year, including summer low flow period; and
3. Lamprey migration and rearing – throughout year.

b) Inadequate water quality (low flow-induced and contaminants)

Mill Creek’s water quality conditions range from near pristine near the headwaters to highly degraded water quality below the U.S. Army Corps of Engineers (USACE) Bennington and Division Works Dams, through the City of Walla Walla, to the mouth. The degraded water quality largely results from agricultural run-off and point-source pollution, water withdrawals, and highly modified channels and riparian areas due to urban development. Portions of Mill Creek are listed on Washington State’s Water Quality Assessment and 303(d) list of impaired water bodies for the following pollutants: ammonia-nitrogen (ammonia-n), chlorine, dissolved oxygen, pH, fecal coliform, and temperature.\(^\text{14}\) These pollutants can affect the health of humans, fish, and the quality of fish habitat. The portion of Mill Creek located within the state of Oregon is included on the ODEQ 303(d) (TMDLs) for temperature.\(^\text{15}\)

c) Extreme floodplain encroachment and channelization

Prior to concentrated human settlement, the Mill Creek watershed was a free-flowing system, likely comprised of pool riffle complexes with numerous off-channel habitats, springs, and streams in the

\(^{13}\) See Lower Mill Creek Habitat and Passage Assessment, CTUIR
\(^{14}\) See Lower Mill Creek Habitat and Passage Assessment, CTUIR, Page 2-154, Table 2.61 TMDL Listings
\(^{15}\) See Lower Mill Creek Habitat and Passage Assessment, CTUIR, Page 2-154, Table 2.61 TMDL Listings
lower watershed. This system would have naturally flooded during high flows, distributing water and sediment across the alluvial fan, creating floodplain channels, backwaters, and elevated ponded areas that could contribute delayed return flow to the stream channels during lower flows. Over the last 150 years, lower segments of Mill Creek have undergone extreme habitat modifications. Urbanization and flood control has resulted in a very restricted Mill Creek channel and floodplain characterized by riprap and concrete. In addition, there are approximately 250 cross-channel concrete weirs that impede fish passage and pool up summer flow making it more susceptible to solar heating. Due to channelization, the Mill Creek channel is poorly connected to its floodplain and there is limited ground-to-surface water interaction which can help to maintain water quantity and quality during summer low flow periods.16

The currently depressed runs of salmon and steelhead in the Walla Walla Basin are not sufficient to sustain the exercise of Indian treaty or sport fisheries. The conditions summarized immediately above have contributed to this situation. The average 10-year basin adult returns for spring Chinook is 400 (8% of the basin goal of 5,250) and steelhead is 750 (13% of the basin goal of 5,600).17

C. SUBJECT AREA 3: Identify, analyze, and recommend near-term options, using existing infrastructure to augment instream flows during critical timeframes for fish while maintaining and potentially enhancing the City’s ability to meet water supply goals.

Over the past 18 months, approximately one dozen options were discussed and examined. The following near-term project options, relating to additions or modifications to the City’s existing municipal water supply system infrastructure, have the potential for both enhancing stream flows during critical times and improve the City’s ability to meet its water system supply goals:18

1. Water Treatment Plant Improvement Project

This short-term project relates to the improvement of the quality of the City’s water supply by the addition of:

a) A roughing filter, this will improve water quality and will operationally enhance the City’s present and planned ASR project; and

16 See Lower Mill Creek Habitat and Passage Assessment, CTUIR
17 Personal communication with Gary James, Fisheries Program Manager, CTUIR
18 See Appendix E, Table 1
b) An ultra violet light, equipment that will provide for greater disinfection of its water supply.

This two-element project was initiated in 2010 and is projected to be completed in 2018. The projected total cost is approximately $24,000,000. Funding of the project is supported by low interest loans from the Drinking Water State Revolving Fund (DWSRF). This project has the potential to increase ASR storage. The roughing sand filter will reduce the turbidity of water from Mill Creek. Water with a turbidity of less 1 NTU is required for ASR recharge. Additional low turbidity water will be available for ASR recharge once the project is complete.

2. Water Supply System Pipes Replacement Project – Reduce Diversions

This combination near and long-term project relates to the replacement of leaky pipes within the City’s water supply system. Historically, the system, prior to the delivery to its water users, has leaked up to 1,000,000,000 gallons each year. The project, which is now being implemented is planned for completion with the replacement of 90 miles of water conveyance pipe in approximately 60 years (2075). The estimated project cost is $60,000,000 with financing derived primarily from water system user-rate payers. See Appendix F for a detailed description and analysis of the project. Over the long-term, it will reduce the amount of water the City will need to divert from Mill Creek to satisfy its needs.

3. Advanced Metering Infrastructure (AMI) Project – Enhancement Project.

This near term on-going project is an important element of the City’s on-going water supply conservation plan. Among other benefits, it aids in identifying leaks in customer’s water conveyancing facilities. This is accomplished by hourly reading of approximately 11,000 water meters of customers. This project was initiated in 2015 and was completed and operational in 2018. The cost of the project is approximately $6,000,000 with funds provided by municipal bonds that are to be paid back with water system rate payer funds. The system measures hourly water usage and is able to identify customers with continuous water usage. The customers are then notified they have leaks, often toilets continuously running and irrigation systems with large continuous leaks.


This both near and long term project, with its potential for the greatest of benefits of the projects evaluated, relates to the addition of storage-withdrawal wells to the City’s municipal water supply
system’s approved ASR reservoir. As previously noted, the City’s ASR reservoir has an approved storage capacity of 11,000 acre feet but the City is, as a practical matter due to the City’s present wells’ limited capabilities, presently restricted to store-recover not more than 2,310 acre feet yearly from fault blocks 1 and 2 (with an approved total capacity of 6,750 acre feet). This project, with the addition of wells, increases the ability to store and recover groundwater thereby increasing the flexibility of the City, when stored water is available to satisfy City needs, to engage in the reduction of diversions from Mill Creek during critical low-flow periods.

The following is a sequenced implementation schedule of the well additions to the City’s ASR program.

a) Well 6, associated with fault block 2, is planned for accomplishment in 2020 at the cost of approximately $500,000 through combined funding from the City and other sources.

b) Well 5, associated with fault block 3, is planned for accomplishment in 2021 at the cost of approximately $2,000,000 through combined funding from the City and other sources.

c) Well 2, associated with fault block 1, is planned for accomplishment in 2026 at the cost of approximately $1,500,000 through combined funding from the City and other sources.

d) Well 7, located in fault block 2, is planned for a location change in 2036, at an estimated cost of $2,500,000 through combined funding from the City and other sources.

See Appendix F for a more extended description and analysis of each well phase.

5. Pilot “Source-Switch” Project – A combined City and CTUIR One Year Endeavor

This one-year duration project, which is designed to inform similar implementation potential over the long-term, relates to the City’s reduced-diversions of waters of Mill Creek during a two-month period from August 1 through September 30, 2018. The basic elements of the program are as follows:

a) The City would pump groundwater during a critical low flow period thereby resulting in a reduction of diversions from Mill Creek.
b) A proposed water “source-switch” agreement with the Washington Water Trust would pay for actions incurred by the City, as described in “a” above.
c) The City would resume diversions from Mill Creek during the two month period when required to ensure the City’s water supply needs are satisfied if emergency situations arise.

6. Solar Power Project
This City-CTUIR proposal is included for further discussion in order to determine whether it can be recommended for implementation, either on a short or long-term basis. This project envisions building a solar farm. The power produced from the solar farm would offset the energy required to pump wells during low flow periods. Whenever the City reduces reliance on its Mill Creek diversion, it loses hydroelectric generation and requires extra energy to pump the wells. The overall intent of the project is to balance solar energy production against the extra energy the City incurs when relying on groundwater sources for its municipal needs.

7. Ongoing Complementary Projects
In the pursuit of the above described Mill Creek restoration activities over the near and long term, there is a need to take into account other Walla Walla water and flood plain habitat enhancement projects that complement those activities. (see Appendix H and Appendix E/Table 2 for details of these projects).

D. SUBJECT AREA 4: Identify, analyze, and recommend long-term infrastructure and management options to augment instream flows during critical timeframes for fish while maintaining and potentially enhancing the City’s ability to meet water supply goals.

The following long-term project options, using the City’s existing municipal water supply system infrastructure and modifications of its management, have the potential for both enhancing stream flows during critical times and the City’s ability to meet its water supply goals:

This project is focused on replacing water delivery infrastructure in 90 miles of the leakiest pipes. The project has been ongoing for eight years and will take approximately 60 total years to completely replace all failing pipes. See Appendix F.
2. Improvements to City’s Department of Ecology Approved Aquifer Storage and Recovery (ASR) Project.

The next major ASR project will be upgrading well #5 to ASR. This project will expand ASR to the third and last fault block storage area. This project will require satisfaction of significant permit conditions centering on extensive ground water quality testing. This project is currently planned for 2021. For additional ASR wells planned in the future, see Appendix F.

E. SUBJECT AREA 5: Identify actions necessary to implement any options recommended for pursuit.

In relation to the four ASR projects and the two Use/Conveyance efficiency projects, identified in Appendix E, Table 1 – Planning Summary of Recommend Projects, actions needed to implement most if not all are the following:

1. Development of project outline templates;
2. Development of implementation schedules;
3. Acquisition of funds, including loans and grants, from various sources;
4. Retention of consultants, including hydrogeologists and water quality experts;
5. Development of plans and specifications;
6. Acquisition of necessary permits and approvals, including City ASR permit modifications as appropriate;
7. Construct phase of the projects; and
8. Development and funding of long-term operation and maintenance plans.

IV. CONCLUSIONS

The City, CTUIR and WDFW have worked collaboratively to identify near and long-term water projects that have provided both improvements to the City’s municipal water supply system and instream flow benefits for Mill Creek. It is anticipated that the near and long-term water projects identified, as outlined in Table 1, Appendix F, in this report will serve as the foundation for a future collaborative relationship between the group. The report balances a plan for Mill Creek water flow restoration in association with the enhancement of the municipal water system. It is anticipated that the three entities may formalize a subsequent agreement following this report so that each would commit to continued collaboration and support for implementing future Mill Creek water
projects for the good of both the municipal system and instream flow/fish purposes. The identification, screening and selection of projects with benefits identified in this report should serve as a tool or rationale to help secure support and funding that will be necessary for implementation of these projects.

This report concludes in an optimistic and productive spirit for the future by recommending:

1. The pursuit of various projects as outlined in Table 1, Appendix F. These projects, which rely on the City’s infrastructure, are designed to augment critically low instream flows of Mill Creek in combination with the enhancement of the City’s ability to better meet its water supply goals;

2. The establishment of a similarly organized group to address general municipal water supply and Mill Creek instream flow enhancement proposals by the group and potentially with others that have interest in Mill Creek, and

3. The continuation, with the same spirit, collaboration between the City, CTUIR, and WDFW in addressing any other public policy issues that may arise in which they have mutual interest(s).
V. APPENDICES

A. Watershed Map
City of Walla Walla & Mill Creek Watershed

36 Square Mile Watershed Boundary

Sources: Esri, USGS, NOAA

Print Date: 3/6/2018
B. ASR Block Map
C. ASR Conceptual block profile
D. Reservoir Permit No. 3R-50526
June 2, 2016

Ki Bealey, Public Works Director
City of Walla Walla
55 East Moore Street
Walla Walla, Washington 99362

Re: Reservoir Permit No. R3-30526

Dear Mr. Bealey:

Enclosed is the City of Walla Walla’s reservoir permit to be retained for your records. Please read the enclosed information sheet, as well as your entire permit. Complying with the provisions of the permit will maintain the permit in good standing.

This permit requires development of a monitoring plan and annual reporting. The elements required for the annual report are listed in Table 6 of the permit. The first annual report is due December 1, 2016. The City will need to submit three copies of the annual report for the reservoir permit, one each for: Ecology’s Water Quality Program, Ecology’s Water Resources Program and one to the Natural Resources Department of the Confederated Tribes of the Umatilla Indian Reservation (CTUIR).

Electronic copies of this letter and the permit have been provided to the staff engaged in this project.

Our information indicates you have begun construction of your project. We are enclosing a Construction Notice form. Once you finish construction, submit the completed form to this office. If the project is not complete by December 31, 2035, the City must contact this office to apply for an extension.

If you have any questions, please contact Victoria Leuba before June 16th, or Eric Hartwig after that date.

Sincerely,

Karen Tusa
Water Resources Program
Eastern Regional Office

cc: Eric Quaempts, Natural Resources Director, CTUIR
    Nabi Shawa, City Manager, City of Walla Walla
    Llyn Doremus  lynn.doremus@ecy.wa.gov
    Gary James  gary.james@ctuir.org
    Eric Hartwig  eric.hartwig@ecy.wa.gov
    Frank Nicholson  fnicholson@wallawalla.wa.gov
STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

RESERVOIR PERMIT
TO APPROPRIATE PUBLIC WATERS OF THE STATE OF WASHINGTON

APPLICATION DATE
December 21, 2006, as modified on July 6, 2009

RESERVOIR APPLICATION NUMBER
R3-30526

MAILING ADDRESS
City of Walla Walla
15 North 3rd Avenue
Walla Walla, WA 99362

RESERVOIR LOCATION
Wanapum and Grande Ronde Basalt Formations underlying the City of Walla Walla and surrounding areas

Location of Storage Aquifer
The reservoir, consisting of three fault blocks, is located underground and underlies portions of Townships 6, 7 and 8 North and Ranges 35, 36 and 37 E.W.M. Figure 1, attached, sets forth a surface representation of the storage blocks derived by geo-referencing the reservoir and its block boundaries as portrayed by Golder and Associates in the City of Walla Walla Aquifer Storage and Recovery Reservoir Permit Application (Application of 2009) with township, range, section and City boundary layers. This decision authorizes the use of fault blocks I and II for storage and recovery. Fault block III is not authorized for use without further approval by the Department.

Table 1

<table>
<thead>
<tr>
<th>Water Source</th>
<th>SOURCE LOCATION</th>
<th>WATERBODY</th>
<th>TRIBUTARY TO</th>
<th>LATITUDE</th>
<th>LONGITUDE</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOURCE LOCATION</td>
<td>COUNTY</td>
<td>WATERBODY</td>
<td>TRIBUTARY TO</td>
<td>LATITUDE</td>
<td>LONGITUDE</td>
</tr>
<tr>
<td>Umatilla County, OR</td>
<td>Mill Creek</td>
<td>Walla Walla River</td>
<td>45.9901</td>
<td>-118.0483</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SOURCE PERMIT NUMBERS</th>
<th>MAXIMUM DIVERSION RATE</th>
<th>PRIORITY DATE</th>
<th>PERIOD OF USE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oregon permit 54483</td>
<td>10 cfs</td>
<td>3/2/2001</td>
<td>11/01 – 4/15</td>
</tr>
<tr>
<td>Oregon certificate 87647</td>
<td>10 cfs</td>
<td>3/2/2001</td>
<td>11/01 – 4/15</td>
</tr>
<tr>
<td>Oregon certificate 13276</td>
<td>28 cfs</td>
<td>1866</td>
<td>annual</td>
</tr>
</tbody>
</table>

SOURCE LIMITATIONS
Waters to be diverted from Mill Creek pursuant to these rights are restricted: (1) as to permit 54483 and certificate 87647 to flows measured at the Kooskioke gauge that do not exceed 525 cfs or fall below the following:

<table>
<thead>
<tr>
<th>November</th>
<th>December</th>
<th>January</th>
<th>February</th>
<th>March</th>
<th>April 1-15</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 cfs</td>
<td>110 cfs</td>
<td>110 cfs</td>
<td>125 cfs</td>
<td>150 cfs</td>
<td>150 cfs</td>
</tr>
</tbody>
</table>

and (2) as to certificate 13276 no more than to 25.5 CFS between August 1 and September 30.
### Table 2

**Location of injection wells and Associated Data**

<table>
<thead>
<tr>
<th>Well</th>
<th>Location</th>
<th>Township, Range, Section</th>
<th>Completion Aquifer</th>
<th>Injection Rate (gpm)</th>
<th>Annual Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Well # 1</td>
<td>Block I</td>
<td>SE%NW%S13T7N36E.W.M.</td>
<td>Wanapum and Grande Ronde</td>
<td>1300</td>
<td>1650 acre-feet/yr</td>
</tr>
<tr>
<td>(existing)</td>
<td>Block II</td>
<td>SE%NE%S22T7N36E.W.M.</td>
<td>Wanapum and Grande Ronde</td>
<td>1600</td>
<td>2200 acre-feet/yr</td>
</tr>
<tr>
<td>Well # 2</td>
<td>Block I</td>
<td>SE%NW%S13T7N36E.W.M.</td>
<td>Wanapum and Grande Ronde</td>
<td>Not yet authorized</td>
<td></td>
</tr>
<tr>
<td>(existing)</td>
<td>Block II</td>
<td>SE%NE%S22T7N36E.W.M.</td>
<td>Wanapum and Grande Ronde</td>
<td>Not yet authorized</td>
<td></td>
</tr>
<tr>
<td>Well # 3</td>
<td>Block I</td>
<td>SE%NW%S13T7N36E.W.M.</td>
<td>Wanapum and Grande Ronde</td>
<td>Not yet authorized</td>
<td></td>
</tr>
<tr>
<td>(existing)</td>
<td>Block II</td>
<td>SW%NW%S13T7N36E.W.M.</td>
<td>Wanapum and Grande Ronde</td>
<td>Not yet authorized</td>
<td></td>
</tr>
<tr>
<td>MC WTP^a area</td>
<td>Block I</td>
<td>SE%NW%S13T7N36E.W.M.</td>
<td>Wanapum and Grande Ronde</td>
<td>Not yet authorized</td>
<td></td>
</tr>
<tr>
<td>(proposed #8)</td>
<td>Block II</td>
<td>SW%NW%S13T7N36E.W.M.</td>
<td>Wanapum and Grande Ronde</td>
<td>Not yet authorized</td>
<td></td>
</tr>
<tr>
<td>Well # 4</td>
<td>Block I</td>
<td>SE%NW%S13T7N36E.W.M.</td>
<td>Wanapum and Grande Ronde</td>
<td>Not yet authorized</td>
<td></td>
</tr>
<tr>
<td>(existing)</td>
<td>Block II</td>
<td>SW%SW%S22T7N36E.W.M.</td>
<td>Wanapum and Grande Ronde</td>
<td>Not yet authorized</td>
<td></td>
</tr>
<tr>
<td>WWCC^b area</td>
<td>Block I</td>
<td>SE%SW%S14T7N36E.W.M.</td>
<td>Wanapum and Grande Ronde</td>
<td>Not yet authorized</td>
<td></td>
</tr>
<tr>
<td>(proposed #9)</td>
<td>Block II</td>
<td>SE%SW%S14T7N36E.W.M.</td>
<td>Wanapum and Grande Ronde</td>
<td>Not yet authorized</td>
<td></td>
</tr>
</tbody>
</table>

^aMill Creek Water Treatment Plant, ^bWalla Walla Community College

### Table 3

**Location of Recovery Wells and Associated Data**

<table>
<thead>
<tr>
<th>Well</th>
<th>Location</th>
<th>Township, Range, Section</th>
<th>Completion Aquifer</th>
<th>Withdrawal Rate (gpm)</th>
<th>Annual Quantity of stored water</th>
</tr>
</thead>
<tbody>
<tr>
<td>Well # 1</td>
<td>Block I</td>
<td>SE%NW%S13T7N36E.W.M.</td>
<td>Wanapum and Grande Ronde</td>
<td>2500</td>
<td>990 acre-feet/yr^c</td>
</tr>
<tr>
<td>(existing)</td>
<td>Block II</td>
<td>SE%NE%S22T7N36E.W.M.</td>
<td>Wanapum and Grande Ronde</td>
<td>2600</td>
<td>1320 acre-feet/yr^d</td>
</tr>
<tr>
<td>Well # 2</td>
<td>Block I</td>
<td>SE%NW%S13T7N36E.W.M.</td>
<td>Wanapum and Grande Ronde</td>
<td>Not yet authorized</td>
<td></td>
</tr>
<tr>
<td>(existing)</td>
<td>Block II</td>
<td>SW%NW%S13T7N36E.W.M.</td>
<td>Wanapum and Grande Ronde</td>
<td>Not yet authorized</td>
<td></td>
</tr>
<tr>
<td>Well # 3</td>
<td>Block I</td>
<td>SW%NW%S13T7N36E.W.M.</td>
<td>Wanapum and Grande Ronde</td>
<td>Not yet authorized</td>
<td></td>
</tr>
<tr>
<td>(existing)</td>
<td>Block II</td>
<td>SW%SW%S22T7N36E.W.M.</td>
<td>Wanapum and Grande Ronde</td>
<td>Not yet authorized</td>
<td></td>
</tr>
<tr>
<td>MC WTP^a area</td>
<td>Block I</td>
<td>SE%NW%S13T7N36E.W.M.</td>
<td>Wanapum and Grande Ronde</td>
<td>Not yet authorized</td>
<td></td>
</tr>
<tr>
<td>(proposed #8)</td>
<td>Block II</td>
<td>SW%SW%S14T7N36E.W.M.</td>
<td>Wanapum and Grande Ronde</td>
<td>Not yet authorized</td>
<td></td>
</tr>
<tr>
<td>Well # 4</td>
<td>Block I</td>
<td>SE%SW%S14T7N36E.W.M.</td>
<td>Wanapum and Grande Ronde</td>
<td>Not yet authorized</td>
<td></td>
</tr>
<tr>
<td>(existing)</td>
<td>Block II</td>
<td>SW%SW%S14T7N36E.W.M.</td>
<td>Wanapum and Grande Ronde</td>
<td>Not yet authorized</td>
<td></td>
</tr>
<tr>
<td>WWCC^b area</td>
<td>Block I</td>
<td>SE%SW%S14T7N36E.W.M.</td>
<td>Wanapum and Grande Ronde</td>
<td>Not yet authorized</td>
<td></td>
</tr>
<tr>
<td>(proposed #9)</td>
<td>Block II</td>
<td>SE%SW%S14T7N36E.W.M.</td>
<td>Wanapum and Grande Ronde</td>
<td>Not yet authorized</td>
<td></td>
</tr>
</tbody>
</table>

^aMill Creek Water Treatment Plant, ^bWalla Walla Community College, ^cplus any carryover of stored water from any previous annual injection quantities (see Provisions beginning on page 4 and the carryover paragraph of pages 5 and 6). Recovery of stored water is in addition to the ground water withdrawals authorized under existing Washington State water rights.

### Table 4

**Waters to be stored for beneficial uses**

<table>
<thead>
<tr>
<th>Source water right numbers</th>
<th>Maximum injection rate</th>
<th>Maximum withdrawal rate</th>
<th>Maximum annual acre-feet storage(including carryover)/recovery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oregon Permit S-54483</td>
<td>Well #1: 1300 gpm,</td>
<td>Well #1: 2500 gpm,</td>
<td>11,750 acre-feet/7050 acre-feet</td>
</tr>
<tr>
<td>Oregon Certificate 87647</td>
<td>Well #6: 1600 gpm</td>
<td>Well #6: 2600 gpm</td>
<td></td>
</tr>
<tr>
<td>Oregon Certificate 13276</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

RESERVOIR PERMIT

Page 2

R3-30526
Legal Description of Property on which Water is to be Used

The Area Served by the City as described in the Washington State Department of Health, Office of Drinking Water (DOH/ODW) approved City Water System Plan including periodic updates

Description of ASR Project

The City has operated an Aquifer Storage and Recovery (ASR) type system using well #1 since 1999 and well #6 since 2003.

The City proposes to divert up to 48 cfs of Mill Creek water at their diversion facility located within the NW%NE% S. 22, T. 6 N., R. 38 E.W.M. in Umatilla County in the State of Oregon. This water diversion is authorized by three State of Oregon water rights: permit number S-54483, certificate number 87647, and certificate number 13276. The authorizations are for municipal supply. Permit number S-54483 and Certificate number 87647 limit water diversion to monthly instream flow restraints from November 1 through April 15. No diversion under S-54483 and 87647 is authorized from April 16 – October 31.

Diverted water is conveyed down the City’s pipeline to its power generation facility and thereafter to its Mill Creek Water Treatment Plant where it will be treated to meet State of Washington and Federal drinking water standards. After treatment, up to 6.4 cfs may be injected through the approved injection wells into the underground reservoir. The injection rate may be increased if and when additional injection wells are approved. Stored water may be recovered for distribution into the City’s water system as needed at rates and locations not to exceed those authorized in this report and any subsequent permit amendments. The City’s existing wells #1, #2, #3, #4, and #6 are points of withdrawal associated with City owned groundwater certificates, issued by the State of Washington, authorizing withdrawal of public waters of the state on a year-round basis for municipal supply purposes. The same wells will be points of withdrawal for water authorized to be withdrawn under the reservoir permit. Wells #2, #3, and #4 are not currently modified to be injection wells. The City may request these wells be added as injection wells (after appropriate well modifications) through change applications, see amendment procedures on pages 7-8. Wells will be maintained by the City by periodic purge pumping. Backwash water will be discharged to existing approved system or to storage or infiltration basins.

Table 5

<table>
<thead>
<tr>
<th>BEGIN PROJECT</th>
<th>COMPLETE PROJECT</th>
<th>FULL STORAGE DEVELOPMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Begun in 1999</td>
<td>December 31, 2035</td>
<td>December 31, 2035</td>
</tr>
</tbody>
</table>

Proposed Works

The proposed works for this project consist of the City’s screened diversion facility, pipeline, power generation facility, Mill Creek Water Treatment Plant (WTP), two authorized wells listed above, and municipal water distribution system.

Remarks

Unless otherwise specified all monitoring and reporting requirements are based on an annual water year defined as October 1st through September 30th.

The Department’s decision is based on the capacity of the two existing operational injection wells, and the future operating capacity of the system as reported by the City. The recovery volume is based upon the mass balance data presented in the application which the Department concludes is a maximum annual recovery rate of 60%. The Department authorizes an allowance for annual carryover if less than 60% of the amount injected is recovered during the water year as described on page 4 of this Remarks section, see also provisions section, carryover paragraph on pages 5 and 6.
Block I and Block II as depicted on Figure 1 are the authorized storage reservoir. Any water escaping the reservoir boundaries as depicted on Figure 1 is waters of the state and is available to satisfy existing water rights.

The City’s pilot project has been in operation for more than a decade. Water from previous storage years likely remains available for recovery. As there is a need for additional data to make assessments on the amount or percentage of water that has not “leaked” from storage, the Water Resources Program, after consultation with the City, estimates that availability of stored water decreases by 10% annually. The City is allowed to recover these carryover amounts, see Provisions on pages 5-6. These amounts, through the amendment process set forth beginning on page 7, are subject to change when sufficient data has been collected and analyzed to provide a more informed basis for the calculation.

In order to meet the annual storage capacity, additional injection and recovery wells are expected to be used for Blocks I and II. As these wells are brought into service, they will be subject to the 60% annual recovery quantity and carry over percentages until that quantity is changed through amendment (see the amendment process on pages 7-8).

This project includes injection of chlorinated drinking water from the City’s treatment plant. The Department’s Water Quality Program has conducted a review of this project and based on the information provided determined that the benefits of the project outweigh the potential risk of adverse impacts. The City must continue to follow DOH/ODW and US EPA guidance and requirements to minimize the formation of disinfection by-products to the maximum extent reasonable.

Use of an additional fault block (Block III) for storage and recovery will require approval through the amendment process on pages 7-8 for both the storage potential of Block III and points of injection/withdrawal. The City will be required to conduct pilot testing of this untested block to gain an understanding of its hydrologic properties and to identify any additional injection and recovery wells. The City may request a pre-application consultation with the Department to identify the detailed information the Department will require to support an application. Upon receipt of the hydrologic testing results and an application for changes to the permit, the Department will determine if and when Block III shall be authorized by a permit amendment. The amendments shall identify the conditions that will govern ASR operations, e.g. percent recovery, injection rate, recovery rate. The Department and DOH/ODW will also review proposed future additions of storage blocks and conversion of additional City wells or newly constructed wells to be used for injection and recovery as those additions are requested by the City through the amendment process on pages 7-8.

The City has requested to have access to stored water above the annual 60% and accumulated carryover recovery amounts in the event an emergency arises. Through filing of an application to use the ASR facilities during any catastrophic or emergency event that renders Mill Creek water unavailable, the City may request access to additional stored water as an emergency supply. The Department would be guided in processing such an application by the Water Resources Program Policy-1045: Emergency Water Source Authorization.

The **Provisions** section below describes the data reporting requirements for the ASR permit. Pertinent information derived through the reporting will be incorporated into a Monitoring Plan, maintenance and implementation of which will become a provision of the permit through an amendment.

**Provisions**

This authorization is subject to cancellation by the Department if the following provisions are not met:

During the first two years of the exercise of the permit, the City shall develop a Monitoring Plan for the project that will be submitted to The Department. It will include a Quality Assurance Project Plan (QAPP) for the specifics on monitoring, data quality objectives, sampling, and reporting. A plan shall be implemented within the first three years of the effective date of this permit. The City will implement the monitoring plan within 90 days after the effective date of the Department’s approval.
Water Quality Provisions
In addition to the monitoring requirements established by the DOH/ODW, the City shall conduct water quality monitoring in all authorized ASR wells as shown in Table 7. Sampling and analysis frequency may be modified based on accumulated data, if the City and the Department agree and at least two years of data has been collected, submitted and reviewed.

Should the total trihalomethane (THM) concentration of any sample be at or above 50% of the Federal maximum contaminant limit (MCL) for drinking water, all ASR operations shall cease. ASR operations shall not resume until a plan to reduce or eliminate the THM concentrations in the source water and the aquifer has been submitted to and approved by the Department and the plan has been implemented by the City.

Water Quantity Provisions
The quantities of water authorized for storage and recovery are maximum limits that shall not be exceeded.

Water for this project is provided under Oregon established municipal water rights as described on pages 1 and 2. Injection of water into the storage reservoir is not authorized as follows:

1. No water shall be injected into the storage reservoir when the Mill Creek flows are (a) above 525 cfs as measured at the Kooskooskie gauge and (b) during a consecutive 61 day period during the critical low flow period of August – November. The start date for the non-injection will be determined by the City unless an alternative written start date request is received by the City prior to July 31 from the fisheries co-managers: the Confederated Tribes of the Umatilla Indian Reservation and the Washington Department of Fish and Wildlife, in which case the start date is the requested date.

2. No water shall be injected into the storage reservoir when the City is diverting more than 24 cfs when Mill Creek flows, measured at USGS Kooskooskie gauge, are less than:

<table>
<thead>
<tr>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
<th>Jan</th>
<th>Feb</th>
<th>March</th>
<th>April</th>
<th>May</th>
<th>June</th>
<th>July</th>
<th>Aug</th>
<th>Sep</th>
</tr>
</thead>
<tbody>
<tr>
<td>cfs</td>
<td>32</td>
<td>35</td>
<td>37</td>
<td>44</td>
<td>53</td>
<td>63</td>
<td>86</td>
<td>64</td>
<td>39</td>
<td>32</td>
<td>31</td>
</tr>
</tbody>
</table>

3. No water shall be injected into the storage reservoir when the City is diverting 24 cfs or less when Mill Creek flows, measured at the City gauge located immediately downstream of the existing City diversion dam, are less than:

<table>
<thead>
<tr>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
<th>Jan</th>
<th>Feb</th>
<th>March</th>
<th>April</th>
<th>May</th>
<th>June</th>
<th>July</th>
<th>Aug</th>
<th>Sep</th>
</tr>
</thead>
<tbody>
<tr>
<td>cfs</td>
<td>13</td>
<td>13</td>
<td>15</td>
<td>20</td>
<td>25</td>
<td>30</td>
<td>30</td>
<td>25</td>
<td>15</td>
<td>14</td>
<td>13</td>
</tr>
</tbody>
</table>

The City shall analyze recovered water samples for conductivity, alkalinity, and concentrations of sodium, sulfate, fluoride, arsenic, manganese, and iron. The recovered water data will be evaluated in the context of ground water data for these parameters collected prior to 1999. This data will be used to inform chemical mass balance and mixing calculations. These calculations will be used to determine the percentage of stored water that is recoverable. The method to be used for mass balance calculations is described in the application of 2009, attachment B of appendix A.
• The maximum quantity allowed for storage within the described aquifer shall not exceed 11,750 acre-feet annually.
  o The City will report to the Department annually a Block-by-Block summary (with a well-by-well breakdown) of the total quantity of water pumped by existing groundwater rights, water stored and recovered, and carryover storage.
  o Each year, recovery wells under the proposed project shall not collectively recover an amount greater than the sum as described below:
    ▪ Total water available for recovery in any one year is 60% of the amount injected during that year plus the carryover amount. Carryover amount is defined as the sum of each year’s carry over water reduced by 10% for each successive year that water remains as stored water.
    ▪ If requested by the City, no earlier than two years after the effective date of this permit, the Department shall conduct an analysis of the 60% recovery rate for the purpose of determining whether the rate should be modified. The analysis shall be based on the information contained in reports on the reservoir’s operation submitted by the City and other relevant information available to the Department. The determination may be pursued through the amendment process on pages 7-8. Additional modifications of the recovery rate may be requested by the City no earlier than five years after the last determination decision.
• The maximum pumping rate for each of the recovery wells shall not exceed the instantaneous quantity authorized in the City’s groundwater right certificates that are independent of this ASR permit, unless otherwise approved by the Department. The City will have to be especially vigilant about the quantities of water pumped from any new recovery wells that are not associated with any of the City’s water rights. If additional pumping is desired from new wells, the wells must be added as authorized points of withdrawal to one or more of the City’s existing rights through the amendment process on pages 7-8.
  o The pumping rate may be increased subject to Department approval, based upon annual recovery calculations that fully take into account recharge quantities injected and the timing and duration of recovery of stored groundwater. Injection and recovery may not at any time under this permit exceed the limits specified in Tables 2 and 3.
  o Through the amendment process on pages 7-8, the City may request amendment of Tables 2 and 3 when additional wells are retrofitted for injection and shown to penetrate either fault Block I or II.
• Any increases to the storage quantity and/or injection/recovery quantities beyond the maximum quantities herein approved, shall require the City to file an application to amend the permit as described on pages 7-8.
• This authorization is for the use of fault Blocks I and II. If the City proposes to begin storage and recovery in Block III, pilot testing shall be conducted by the City to gather and submit the data on hydrologic properties for this Block. After the City has participated in a pre-application meeting, the City may request a permit amendment pursuant to the amendment provisions listed on pages 7-8.
• Data collected during development of this ASR permit may be used to support future ASR applications.

The reservoir permit for this project authorizes the City to store water in the Wanapum and Grande Ronde formations identified as Blocks I and II. (See description of this aquifer in appendix A of Golder and Associates: City of Walla Walla Aquifer Storage and Recovery Reservoir Permit Application (Application of 2009)).
• The reservoir permit shall remain in effect for a period of twenty (20) years, unless otherwise cancelled by the Department or voluntarily terminated by the City. If the project remains viable as determined by the City, the Department shall grant an extension to the permit subject to review of project results submitted annually and/or as part of an extension request. Extensions beyond the 20 year development schedule
will be governed by the process in RCW 90.03.280 relating to public notice and opportunity to comment. Extensions granted for the development of the reservoir facilities shall not exceed a total of fifty (50) years from the effective date of this permit.

- The City must provide written notification to the City of College Place and the Confederated Tribes of the Umatilla Indian Reservation of any requested amendments to the issued permit contemporaneously with its filing with the Department.

**Reporting**

The City shall submit an annual report of operations and monitoring to the Department by December 1st each year. Table 6 lists the actions required of the City for system monitoring. All monitoring is based on a water year: October 1st through September 30th. The due date for monitoring results is December 1st of each year to allow analysis, evaluation and interpretation of the annual results for the water year.

<table>
<thead>
<tr>
<th>Table 6</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Frequency of sampling and data required to be submitted through an annual report</strong></td>
</tr>
<tr>
<td><strong>ACTION</strong></td>
</tr>
<tr>
<td>Summarize quantity of water pumped by existing groundwater rights through ASR authorized wells.</td>
</tr>
<tr>
<td>Summarize carryover storage.</td>
</tr>
<tr>
<td>Summarize water injection and recovery volumes for each well.</td>
</tr>
<tr>
<td>Analyze recovered waters for Conductivity, Alkalinity, Sodium, Sulfate, Fluoride, Arsenic, Manganese, and Iron; record raw data in annual report.</td>
</tr>
<tr>
<td>Based on the data developed above, provide the chemical mass balance and break through curve calculations for each well on an annual basis and by a percent of recovered water basis (0%, 50% and 100% recovery volumes).</td>
</tr>
<tr>
<td>Analyze THM concentration of injected water and of recovered water.</td>
</tr>
<tr>
<td>Provide quarterly THM concentration from operating municipal supply wells in current use.</td>
</tr>
<tr>
<td>Record and provide annual groundwater elevation hydrographs for the water year (October 1st – September 30th) for each ASR well.</td>
</tr>
<tr>
<td>Record and provide annual groundwater elevation hydrographs for the water year (October 1st – September 30th) for each operating City well.</td>
</tr>
</tbody>
</table>

In addition to the "Actions and Frequency" noted above, the annual report shall provide:

- an estimate, based on measurement of native and injected water ratios, of recoverable stored water for the completed recharge/recovery cycle and a forecast for the next water year’s water storage cycle;
- descriptions of mitigations required due to any operational or environmental issues that occurred, such as development of flowing artesian wells, wetlands development, flooding or land erosion.

An approved measuring device shall be installed and maintained for each injection and recovery well in accordance with the rule "Requirements for Measuring and Reporting Water Use", Chapter 173-173 WAC and WAC 173-157-170.

Installation and maintenance of an access port as described in WAC 173-160-291(3) is required on each well. An air-line and gauge may be installed in addition to the access port.

If it can be shown that the project has a detrimental effect on existing rights or negative impacts to the environment, it shall be the responsibility of the operator to mitigate for any impact and/or alter or cease operation of the ASR project.
In addition, during the first two years of the exercise of the permit and prior to requesting a permit amendment to add new injection and recovery wells or to modify the storage recovery percentage, as described on page 8, the City shall (1) pursue formation of a work group, consisting of representatives of the City, CTUIR and WSW, for the purpose of addressing near- and long-term issues associated with Mill Creek, including tributaries and distributaries, as hereafter set forth, and (2) develop a comprehensive report or reports in collaboration with the two entities addressing, at a minimum, the following:

- Define near- and long-term municipal water supply and fishery and other instream flow use goals;
- Identify existing issues inhibiting accomplishment of water supply goals;
- Identify, analyze, and recommend near-term options, using existing infrastructure, to augment instream flows during critical timeframes for fish while maintaining and potentially enhancing the City’s ability to meet water supply goals;
- Identify, analyze, and recommend long-term infrastructure and management options to augment instream flows during critical timeframes for fish while maintaining and potentially enhancing the City’s ability to meet water supply goals; and
- Identify actions necessary to implement any options recommended for pursuit.

Amendments

Upon a written request by the City, the permit issued subsequent to issuance of this ROE is open to amendments, among other subjects, to the following:

1. Sampling frequency:
   The sampling frequency may be changed through an agreement reached by the City and The Department’s Water Resources and Water Quality Programs,

2. Addition of injection and recovery wells for Blocks I and II:
   Adding additional injection and recovery wells will require the City to file a request with the Department to amend the permit. (Newly added injection wells must be registered with The Department’s Underground Injection Control program.)

3. Addition of Block III to the reservoir permit:
   Addition of the third storage Block to this permit will require the City to file an application for change to the permit which provides supporting data sufficient to satisfy the standards for review and mitigation of adverse impacts to satisfy the issues enumerated in RCW 90.03.370(2)(a),

4. Modification of the percentage of injected water that is recoverable:
   The City may request or the Department may initiate a review of the permit with supporting data for the purpose of amending both annual and carry over recovery percentages. This type of amendment shall follow the process in RCW 90.03.280 relating to public notice and comment period.

5. Adoption of a Monitoring Plan:
   The City may request or the Department may initiate a permit amendment when a Monitoring Plan incorporating the above provisions has been developed by the City and approved by The Department.

The City will notify in writing the protestant of and commenters on the ASR application, i.e. City of College Place, and Port of Walla Walla respectively, of any City proposals to amend the permit. The Department will notify the protestant of any amendments made to the permit.

All final decisions of the Department to amend the permit in response to requests filed by the City, or reviews initiated by The Department, shall be issued through decision documents. These decisions are subject to appeal to the Pollution Control Hearings Board as described on this page 8.
This permit shall be subject to cancellation should the permittee fail to comply with the above development schedule and/or to give notice to the Department of Ecology on forms provided by that Department documenting such compliance.

Dated this 2nd day of June, 2016, at Spokane, Washington,

Department of Ecology

[Signature]

by Keith L. Stoffel, Section Manager

DATA REVIEW
OK     KT

KLS/KT:md
W: Permits/Tusa/Walla Walla City of R3-30526 permit 6-02-2016.doc
E. Table 1 – Planning summary of recommend projects
<table>
<thead>
<tr>
<th>PROJECT TYPE AND BRIEF DESCRIPTION</th>
<th>PROJECT BENEFITS</th>
<th>COST ESTIMATE</th>
<th>TIMELINE</th>
<th>NEXT STEPS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. ASR PROJECTS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A. Upgrade - Existing ASR Well #6, Block 2</td>
<td>Recondition existing ASR well 6 for summer time pumping</td>
<td>$500,000</td>
<td>2020</td>
<td>City lead (project profile)</td>
</tr>
<tr>
<td>This well needs evaluation and maintenance performed before full ASR Pumping. Consult with Hydrogeologist, may pump well #5 as alternate.</td>
<td>+5.79 cfs in summer *</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B. Expand existing wells and infrastructure - Well #5, Block 3</td>
<td>- reduce pressure changes - reduce future piping upgrade/ support UGA growth - improve chlorine mgnt.</td>
<td>$2,000,000</td>
<td>2021</td>
<td>City lead (project profile)</td>
</tr>
<tr>
<td>Upgrades allow for expansion of ASR to 3rd basalt aquifer block.</td>
<td>+3.79 cfs in summer *</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C. Expand existing wells and infrastructure - Well #2, Block 1</td>
<td>- Located at water plant makes for excellent ASR management and operations</td>
<td>$1,500,000</td>
<td>2026</td>
<td>City lead (project profile)</td>
</tr>
<tr>
<td>Upgrades well for expansion of ASR to 1st basalt aquifer block</td>
<td>+3.79 cfs in summer *</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D. Expand existing wells and infrastructure - Well #7, Block 3</td>
<td>- Improve water quality by using ASR or may transfer water right to other wells. (needs study)</td>
<td>$2,500,000</td>
<td>2036</td>
<td>City lead (project profile)</td>
</tr>
<tr>
<td>Upgrades additional well to ASR, plus look at water quality problems, and possibly irrigate cemetery and other large users.</td>
<td>+1 to 6.68 cfs in summer*</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>E. *Solar Farm Project or direct water purchase. A solar farm would produce electricity funded by 3rd party such a BPA. The electricity or direct payment would be used to pay for pumping, maintenance, and loss of hydroelectric generation revenues in exchange for running ASR pumping project during low flow periods in Mill Creek for instream/fish benefits.</td>
<td>Keep water rates neutral while providing for Instream/fish benefits.</td>
<td>Variable with size of solar farm proposed</td>
<td>?</td>
<td>CTUIR/City lead (project profile)</td>
</tr>
<tr>
<td>This project would purchase water from the above listed ASR projects for Instream/fish benefits during periods of low flows in Mill Creek.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>2. USE/CONVEYANCE EFFICIENCY PROJECTS</strong></td>
<td></td>
<td>$6,000,000</td>
<td>2017</td>
<td>City lead (project profile)</td>
</tr>
<tr>
<td>A. Metering of water use via. Telemetry AMI project</td>
<td>- Conserve water for increased use including instream flow</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Water use reduction with savings instream</td>
<td>+1 cfs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B. Improve delivery infrastructure - replace leaky pipes</td>
<td>- Conserve water for increased use including instream flow</td>
<td>$60,000,000</td>
<td>2017</td>
<td>City lead (project profile)</td>
</tr>
<tr>
<td>• Water use reduction with savings instream</td>
<td>+3 cfs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PROJECT TYPE AND BRIEF DESCRIPTION</td>
<td>PROJECT BENEFITS</td>
<td>COST ESTIMATE</td>
<td>TIMELINE (years)</td>
<td>NEXT STEPS (City and/or CTUIR)</td>
</tr>
<tr>
<td>------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------</td>
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<td>-----------------</td>
<td>-----------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>1. WATER PROJECTS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A. Bi-State Flow Project - Columbia R. or Pine Cr. Reservoir supply GFID</td>
<td>- Reduce flow diversion to Yellowhawk; increase Mill Creek flow to WW River</td>
<td>+5-10cfs in L. Mill Creek; WWR flow targets of 150/65cfs in spring to fall</td>
<td>$200-300M</td>
<td>10-15 years</td>
</tr>
<tr>
<td>• Reduce Yellowstone diversion/increase Mill Creek flows</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B. Stormwater upgrades for water quality improvement instream</td>
<td>- City Stormwater Permit - Regional TMDL study requiring stream cleanup</td>
<td>+1 cfs</td>
<td>Various year to year</td>
<td>60 plus years</td>
</tr>
<tr>
<td>• Increase infiltration basins to improve water quality and quantity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C. Bennington Lake management change and/or enlargement</td>
<td>- Add Mill Cr flow (~2,000AF) in spring-early summer; flood risk reduced w/ enlargement</td>
<td>- Increased flow will compliment other sources to ensure fish passage</td>
<td>Mgmt: NA Enlarge: $5-10M</td>
<td>2-3 yrs; 5-10 yrs.</td>
</tr>
<tr>
<td>• Release portion of storage to increase Mill Cr./WW River flows</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>2. FISH PASSAGE/HABITAT/FLOODPLAIN ENHANCEMENT PROJECTS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A. New/upgrade fish ladders at City intake, Bennington &amp; Division dams</td>
<td>- Improve instream habitat and fish runs through town</td>
<td>$5-10M</td>
<td>2-5 years</td>
<td>CTUIR help to secure Corps funds</td>
</tr>
<tr>
<td>• Eliminate fish migration impacts</td>
<td>- Enhance fish migration and access to/from Mill Creek headwaters</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B. Concrete channel enhancement near term</td>
<td>- Improve instream habitat and fish runs through town</td>
<td>$5M</td>
<td>5 years</td>
<td>CTUIR help to secure project funding (SRSRB, BPA, other?)</td>
</tr>
<tr>
<td>• Velocity/resting pool improvements in concrete reach (TSS)</td>
<td>- Enhance fish migration and access to/from Mill Creek headwaters</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C. Mill Cr. floodplain &amp; distributary restoration (as per Assessment/SAP)</td>
<td>- Improve “green way” esthetics, recreation, and fish runs through town</td>
<td>$50M+</td>
<td>5-25+ years</td>
<td>CTUIR help to secure broad project support and funding</td>
</tr>
<tr>
<td>• More natural channel - levee setback, weir removal for multiple</td>
<td>- Regain floodplain function, improved water quantity/quality and fish productivity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>purposes (fish, flood control, esthetics, recreation, etc.)</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>D. COE/Mill Creek Channel Coalition Project</td>
<td>- Improve city flood protection; integrated with channel esthetics benefits</td>
<td>$50M+</td>
<td>5-25 years</td>
<td>CTUIR help to secure Corps funds</td>
</tr>
<tr>
<td>• Possible flood control/channel improvements pending funding</td>
<td>- To be integrated with and compliment other floodplain /fish passage projects</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E. Strengthen floodplain land use/zoning regulations</td>
<td>- Improve “green way” esthetics, recreation, and fish runs through town</td>
<td>NA regulatory</td>
<td>1-2 years</td>
<td>City and CTUIR support and assist with improved regs.</td>
</tr>
<tr>
<td>• Increase floodplain protection from new development</td>
<td>- Decrease floodplain impacts and increase fish habitat productivity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. FLOW AND FISH MONITORING PROJECTS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A. Increase Monitoring for Instream Flows and Fish Returns</td>
<td>- Improve local awareness of Mill Creek channel, flow and fish improvements</td>
<td>NA part of operations</td>
<td>Initiate ASAP</td>
<td>CTUIR initiate and work with City for improvements</td>
</tr>
<tr>
<td>• Improve monitoring capabilities and reporting data to public</td>
<td>- Improve local awareness of Mill Cr. channel, flow and fish improvements</td>
<td></td>
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</tr>
</tbody>
</table>
F. Project Templates listed in Table 1
Title: Upgrade City of Walla Walla Well #7 to Aquifer Storage and Recovery (ASR) – 2036

### 2. Project Status
*Identify whether the proposed project is a past, ongoing or new project and briefly explain the status of the project, including the requested role of the Flow Study in further consideration of the project. If past project, some of the questions below may not be applicable.*

- **New Project** □
- **On-going Project** □
- **Past Project** □

Well #7 is tentatively scheduled to be upgraded in 2036. Full upgrade to Aquifer Storage and Recovery (ASR) would be a $2,500,000 project. This project would be the second ASR well in Block 3.

### 3. General Description of Proposal
*Identify the category(s) and briefly explain the proposed project (e.g. location, infrastructure requirements, maintenance requirements, connection to other new, ongoing or past projects, other stakeholders, various sizing or phasing, etc.).*

- □ a. Water Conservation & Infrastructure
- x b. Aquifer Recharge & Aquifer Storage and Recovery
- □ c. Surface – Groundwater Source Switch
- □ d. Surface Water Storage
- □ e. Pump Exchange
- □ f. Water Right Transactions
- □ g. Point of Diversion Transfers
- □ h. Other

Upgrading well #7 to ASR would have several benefits. A full engineering and hydrogeologic study will be needed to find the best solution to this challenging well. This well is geothermal and has strong odor problem associated with hydrogen sulfide. Many potential solutions exist including:

1. Full ASR recharge, recharging with surface water may create a bubble of the high-quality surface water that surrounds the well and can be recovered, providing high-quality water.
2. Another option would be to seal geologic formations producing poor quality water and perform ASR in the optimal geologic zones.
3. Transferring some of the water rights to a new or existing well.
4. Use this well to irrigate the cemetery and near by public parks and schools reducing water system peak flows thus reducing the amount of water withdrawn from Mill Creek.
5. Other benefits an ASR well would be power generation and improved water distribution chlorine residual in the water distribution system during winter months.
4. **Source of Produced Water:** Mark all applicable and identify (water right number, shallow or deep basalt aquifer, stream name).

- □ a. Existing Water Right

- X b. Groundwater (Walla Walla basalt block #3)

- X c. Surface Water (Running well #7 could reduce the City withdrawal rate at the intake on Mill Creek)

- □ d. Other

5. **City Municipal Water Supply Benefits**

a. City fill in categories: ASR could greatly improve the water quality of this well by creating a bubble of surface water in the geologic formations surrounding the well.

b. City fill in categories: ASR would improve the water system chlorine residual in this distal portion of the water distribution system.

c. City fill in categories: The use of a two-way Variable Frequency Drive (VFD) would cause this well to generate electricity during ASR recharge.

6. **Instream Flow Benefits - Quantity/Timing/Location of Water Produced:** Estimate average amount of water, when and where. Can the project be considered at various sizes (flow outputs) and/or considered in phases?

a. Acre-feet and/or Cubic-feet-per-second: Well #7 currently produces 3,000 gpm or would produce 6.68 cfs.

b. Timeframe(s): This well could be turned on when: In summer during critical low flow periods when passage or water quality problems exist in Mill Creek, thus reducing the surface diversion.

c. Stream Reach Location(s): The reach receiving the additional flow would be from the City water system intake located on Mill Creek at river mile 25.4, located in the pristine protected watershed, through the City of Walla Walla and to river mile zero, located at the confluence of the Walla Walla River. The Walla Walla River reach from the junction of Mill Creek to Columbia River would also benefit from the additional flow.
□ d. UNKNOWN - Need more work (engineering/design/modeling, etc.) to estimate potential instream flow outputs of the project. Will results of this work be concluded within one year to inform potential project flow outputs? Describe additional work needed and cost estimate. N/A

7. Cost Estimates: Provide known and estimated costs to develop and implement the project.

a. Project Development and Design: $200,000 for design and permitting.

b. Project Construction: $2,300,000

c. Construction cost per AF and/or CFS: $344,311 per CFS

d. Project Annual O&M: $15,000

□ c. UNKNOWN - Need engineering/design work to estimate costs

8. Secured Costs: Has any funding been secured in the past or currently and what is the source?

Currently, the City has not budgeted for this project.

9. Other Potential Project Advantages: In addition to helping address flow targets and basin-wide flow issues (Endangered Species Act, Tribal Water Rights, Clean Water Act, etc.), briefly explain other potential benefits (e.g. reduced O&M costs, restores/mimics ecological processes, cropping flexibility,)

This project would add up to 6.68 CFS to Mill Creek during critical times for emergencies, operations, and low-flow fish passage issues. Also converting the VFD to a two way VFD will allow this project to generate electric power.
**10. Other Potential Project Disadvantages:** Briefly explain potential drawbacks of the proposal (e.g. reduced GW supply - recharge mitigation need, increased O&M costs, legal implications)

<p>| | |</p>
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<tbody>
<tr>
<td>If this area is restored to historical artesian pressure, farmers wells will have to be monitored and sealed if they leak due to artesian pressure. However, artesian pressure reduces pumping costs.</td>
<td></td>
</tr>
</tbody>
</table>

**11. Estimated Time Frame to Implement Project?**

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<tbody>
<tr>
<td>The project will require a 6 month study prior to taking 3 to 6 months to construct.</td>
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</tbody>
</table>
# MILL CREEK WATER SUPPLY WORK GROUP

## PRELIMINARY PROJECT PROPOSAL TEMPLATE

**Title:** Upgrade and Maintenance of ASR well #6 - 2020  
Table 1 – ASR Project A.

### 2. Project Status:*

*Identify whether the proposed project is a past, ongoing or new project and briefly explain the status of the project, including the requested role of the Flow Study in further consideration of the project. If past project, some of the questions below may not be applicable.*

- [x] a. NEW PROJECT
- [ ] b. ON-GOING PROJECT
- [ ] c. PAST PROJECT

After 15 years of ASR service, the City hydrogeologist recommends that the well be evaluated and possibly upgraded. A full assessment of water quality and pumping capacity is required before upgrades if any are planned.

### 3. General Description of Proposal:*

*Identify the category(s) and briefly explain the proposed project (e.g. location, infrastructure requirements, maintenance requirements, connection to other new, ongoing or past projects, other stakeholders, various sizing or phasing, etc.).*

- [ ] a. Water Conservation & Infrastructure
- [x] b. Aquifer Recharge & Aquifer Storage and Recovery
- [ ] c. Surface – Groundwater Source Switch
- [ ] d. Surface Water Storage
- [ ] e. Pump Exchange
- [ ] f. Water Right Transactions
- [ ] g. Point of Diversion Transfers
- [ ] h. Other

A study will first have to be performed. Upgrades may include:

1. A new VFD for power generation.
2. Upgraded chlorine disinfection piping.
3. New discharge pipe, possible feed to the water treatment plant or a looped pipe to provide chlorine contact time.

### 4. Source of Produced Water:*

*Mark all applicable and identify (water right number, shallow or deep basalt aquifer, stream name).*

- [x] a. Existing Water Right
x b. Groundwater (Walla Walla basalt block #2)

x c. Surface Water (Running well #6 could reduce the City withdrawal rate at the intake on Mill Creek)

☐ d. Other

5. City Municipal Water Supply Benefits

a. City fill in categories: Banking water using ASR provides the City with a reliable water supply during drought and emergencies such as a fire in the watershed.

b. City fill in categories: The use of a two-way Variable Frequency Drive (VFD) would cause this well to generate electricity during ASR recharge.

c. City fill in categories:  

6. Instream Flow Benefits - Quantity/Timing/Location of Water Produced: Estimate average amount of water, when and where. Can the project be considered at various sizes(flow outputs) and/or considered in phases?

a. Acre-feet and/or Cubic-feet-per-second: Well #6 currently produces 2,650 gpm or 5.79 cfs.

b. Timeframe(s): This well could pump during critical low flow periods when passage or water quality problems exist in Mill Creek, thus reducing the surface diversion.

c. Stream Reach Location(s): The reach receiving the additional flow would be from the City water system intake located on Mill Creek at river mile 25.4, located in the pristine protected watershed, through the City of Walla Walla and to river mile 0 located at the confluence of the Walla Walla River. The Walla Walla River reach from the junction of Mill Creek to Columbia River would also benefit from the additional flow.

☐ d. UNKNOWN - Need more work (engineering/design/modeling, etc.) to estimate potential instream flow outputs of the project. Will results of this work be concluded within one year to inform potential project flow outputs? Describe additional work needed and cost estimate. N/A
7. **Cost Estimates:** Provide known and estimated costs to develop and implement the project.

a. **Project Development and Design:** $50,000 for design and permitting.

b. **Project Construction:** $450,000

c. **Construction cost per AF and/or CFS:** $77,720 per CFS

d. **Project Annual O&M:** $15,000

□ c. **UNKNOWN** - Need engineering/design work to estimate costs

8. **Secured Costs:** Has any funding been secured in the past or currently and what is the source?

Currently, the City has not budgeted for this project

9. **Other Potential Project Advantages:** In addition to helping address flow targets and basin-wide flow issues (Endangered Species Act, Tribal Water Rights, Clean Water Act, etc.), briefly explain other potential benefits (e.g. reduced O&M costs, restores/mimics ecological processes, cropping flexibility,)

This project would add up to 5.79 CFS to Mill Creek during critical times for emergencies, operations, and low-flow fish passage issues. Also adding a two way VFD will allow this project to generate electric power.

10. **Other Potential Project Disadvantages:** Briefly explain potential drawbacks of the proposal (e.g. reduced GW supply - recharge mitigation need, increased O&M costs, legal implications)

This basalt block has been restored to historical artesian pressure, farmer's wells will have to be monitored and sealed if they leak due to artesian pressure. However, artesian pressure reduces pumping costs.
<table>
<thead>
<tr>
<th>11. Estimated Time Frame to Implement Project?</th>
</tr>
</thead>
<tbody>
<tr>
<td>The project will require a 6-month study prior to taking 3 to 6 months to construct.</td>
</tr>
</tbody>
</table>
1. **Title:** Upgrade City of Walla Walla Well #5 to Aquifer Storage and Recovery (ASR) - 2021

2. **Project Status:** Identify whether the proposed project is a past, ongoing or new project and briefly explain the status of the project, including the requested role of the Flow Study in further consideration of the project. If past project, some of the questions below may not be applicable.

   - **x** a. NEW PROJECT
   - □ b. ON-GOING PROJECT
   - □ c. PAST PROJECT

   Well #5 is currently scheduled to be upgraded in 2021. The current plan is an electrical upgrade with a project cost of $500,000. Full upgrade to Aquifer Storage and Recovery (ASR) will be a $2,000,000 project, requiring additional funding of $1,500,000. This project would expand the City ASR program to the 3rd and last basalt aquifer block under the City.

3. **General Description of Proposal:** Identify the category(s) and briefly explain the proposed project (e.g. location, infrastructure requirements, maintenance requirements, connection to other new, ongoing or past projects, other stakeholders, various sizing or phasing, etc.).

   - □ a. Water Conservation & Infrastructure
   - x b. Aquifer Recharge & Aquifer Storage and Recovery
   - □ c. Surface – Groundwater Source Switch
   - □ d. Surface Water Storage
   - □ e. Pump Exchange
   - □ f. Water Right Transactions
   - □ g. Point of Diversion Transfers
   - □ h. Other

   Upgrading well #5 to ASR would have several benefits. The main benefit is well #5 is located in ASR block #3 and currently, there are no ASR wells in this basalt block formation. This would expand the City ASR program by about 1/3 and bank water in a new basalt aquifer block. The banked water would be used during emergencies such as a fire in the watershed, flood damaging the water transmission main from the watershed or to help with fish passage during low flow years. The water right for this well is 1,700 gpm (3.79 cfs). By pumping this well at critical times the City could reduce its Mill Creek diversion by 3.79 cfs.
4. Source of Produced Water: *Mark all applicable and identify (water right number, shallow or deep basalt aquifer, stream name).*

□ a. Existing Water Right

X b. Groundwater (Walla Walla basalt block #3)

X c. Surface Water (Running well #5 could reduce the City withdrawal rate at the intake on Mill Creek)

□ d. Other

5. City Municipal Water Supply Benefits

a. City fill in categories: The electrical infrastructure is old and needs an upgrade to provide reliability.

b. City fill in categories: ASR would recharge basalt block #3, providing a reliable supply during emergencies. Also, this ASR well will have a Variable Frequency Drive (VFD) on it, thus allowing the well to produce electricity during recharge.

c. City fill in categories: A couple of water system benefits exist. This section of the City is growing quickly and experiences pressure fluctuations during the summer irrigation season. Running this well would even out pressure fluctuations, and would reduce the cost of expensive future pipeline projects needed to support growth in this area. In winter, recharging the well would supply water to this section of the system, this will decrease water distribution water travel time and this will help with low chlorine residuals that occur in the distribution system during winter low-flow months.

6. Instream Flow Benefits - Quantity/Timing/Location of Water Produced: *Estimate average amount of water, when and where. Can the project be considered at various sizes(flow outputs) and/or considered in phases?*

a. Acre-feet and/or Cubic-feet-per-second: An upgraded Well #5 would produce 3.79 cfs.

b. Timeframe(s): This well could be turned on when: In summer during critical low flow periods when passage or water quality problems exist in Mill Creek or the water distribution system is seeing pressure fluctuations.

c. Stream Reach Location(s): The reach receiving the additional flow would be from the City water system intake located at river mile 25.4, located in the pristine protected watershed, through the City of Walla Walla and to river mile 0 located at the confluence of the Walla Walla River. The Walla Walla River reach from the junction of Mill Creek to Columbia River would also benefit from the additional flow.
d. UNKNOWN - Need more work (engineering/design/modeling, etc.) to estimate potential instream flow outputs of the project. Will results of this work be concluded within one year to inform potential project flow outputs? Describe additional work needed and cost estimate. N/A

7. Cost Estimates: Provide known and estimated costs to develop and implement the project.

a. Project Development and Design: $250,000 for developing a new ASR block, this requires testing and permitting.

b. Project Construction: $1,750,000

c. Construction cost per AF and/or CFS: $461,741 per CFS

d. Project Annual O&M: $15,000

d. UNKNOWN - Need engineering/design work to estimate costs

8. Secured Costs: Has any funding been secured in the past or currently and what is the source?

Currently, the City is budgeting $500,000 for this project for electrical upgrades. To convert this well to ASR will require an additional $1,500,000 in funding.

9. Other Potential Project Advantages: In addition to helping address flow targets and basin-wide flow issues (Endangered Species Act, Tribal Water Rights, Clean Water Act, etc.), briefly explain other potential benefits (e.g. reduced O&M costs, restores/mimics ecological processes, cropping flexibility, )

This project could add 3.79 CFS to Mill Creek during critical times for emergencies, operations, and low-flow fish passage issues. In addition, hydrologic groundwater modeling has been estimated that 10% of recharge water is lost to upwelling of water, and this would benefit Russell Creek (a steelhead spawning creek) with as much as 0.4 cfs of additional water.
10. Other Potential Project Disadvantages: *Briefly explain potential drawbacks of the proposal (e.g. reduced GW supply - recharge mitigation, increased O&M costs, legal implications)*

If this area is restored to historical artesian pressure, farmer's wells will have to be monitored and sealed if they leak due to artesian pressure. However, the artesian pressure reduces pumping costs.

11. Estimated Time Frame to Implement Project?

The project will take 3 to 6 months to construct. ASR testing, sampling and permitting will probably be two years or more. The well electrical upgrade project is scheduled for 2021. The project will be upgraded to ASR if funds can be found.
1. Title: Upgrade City of Walla Walla Well #2 to Aquifer Storage and Recovery (ASR) – 2026

Table 1 – ASR Project C

2. Project Status: Identify whether the proposed project is a past, ongoing or new project and briefly explain the status of the project, including the requested role of the Flow Study in further consideration of the project. If past project, some of the questions below may not be applicable.

- x a. NEW PROJECT
- □ b. ON-GOING PROJECT
- □ c. PAST PROJECT

Well #2 is tentatively scheduled to be upgraded in 2026. Full upgrades to Aquifer Storage and Recovery (ASR) and is estimated at $1,500,000. This project would expand the City ASR program and would be the second ASR well in ASR block #1. Unlike block #2, block one has never reached artesian pressure. Well #2 is located at the water treatment plant. Recharging wells at the water treatment plant makes ASR recharge operation easy to manage and control. This is important because the water quality of Mill Creek is highly variable during storm events.

3. General Description of Proposal: Identify the category(s) and briefly explain the proposed project (e.g. location, infrastructure requirements, maintenance requirements, connection to other new, ongoing or past projects, other stakeholders, various sizing or phasing, etc.).

- □ a. Water Conservation & Infrastructure
- x b. Aquifer Recharge & Aquifer Storage and Recovery
- □ c. Surface – Groundwater Source Switch
- □ d. Surface Water Storage
- □ e. Pump Exchange
- □ f. Water Right Transactions
- □ g. Point of Diversion Transfers
- □ h. Other

Upgrading well #2 to ASR has several benefits. The main benefit is well #2 is located at the water treatment plant, making it very easy to manage in conjunction with water plant operations. This would expand the City ASR program and bank water in basalt block #1 that has extra capacity for additional water. The banked water would be used during emergencies such as a fire in the watershed, a flood damaging the water transmission main from the watershed, or to help with fish passage during low flow years. The water right for this well is 1780 gpm (3.97 cfs). By pumping this well at critical times the City could reduce its Mill Creek diversion by 3.97 cfs. The Variable Frequency Drive that runs the well will be replaced with one that can generate power during the ASR recharge cycle.
4. **Source of Produced Water:** Mark all applicable and identify (water right number, shallow or deep basalt aquifer, stream name).

- [ ] a. Existing Water Right
- [X] b. Groundwater (Walla Walla basalt block #1)
- [X] c. Surface Water (Running well #2 could reduce the City withdrawal rate at the intake on Mill Creek)
- [ ] d. Other

5. **City Municipal Water Supply Benefits**

   a. City fill in categories: ASR would recharge basalt block #1, providing a reliable supply during emergencies. Also, this ASR well will have a Variable Frequency Drive (VFD) on it, thus allowing the well to produce electricity during recharge.

   b. City fill in categories: Located at the water plant makes for easier ASR management and operations.

   c. City fill in categories: -

6. **Instream Flow Benefits - Quantity/Timing/Location of Water Produced:** Estimate average amount of water, when and where. Can the project be considered at various sizes (flow outputs) and/or considered in phases?
a. Acre-feet and/or Cubic-feet-per-second: An upgraded ASR Well #2 would produce 3.97 cfs.

b. Timeframe(s): This well could be turned on when: In emergencies and in summer, during critical low flow periods when passage or water quality problems exist in Mill Creek, thus reducing the surface diversion.

c. Stream Reach Location(s): The reach receiving the additional flow would be from the City water system intake located on Mill Creek at river mile 25.4, located in the pristine protected watershed, through the City of Walla Walla and to river mile zero, located at the confluence of the Walla Walla River. The Walla Walla River reach from the junction of Mill Creek to Columbia River would also benefit from the additional flow.

d. UNKNOWN - Need more work (engineering/design/modeling, etc.) to estimate potential instream flow outputs of the project. Will results of this work be concluded within one year to inform potential project flow outputs? Describe additional work needed and cost estimate. N/A

### 7. Cost Estimates: Provide known and estimated costs to develop and implement the project.

- **a. Project Development and Design:** $150,000 for design and permitting.

- **b. Project Construction:** $1,350,000

- **c. Construction cost per AF and/or CFS:** $356,200 per CFS

- **d. Project Annual O&M:** $15,000

- **□ c. UNKNOWN** - Need engineering/design work to estimate costs

### 8. Secured Costs: Has any funding been secured in the past or currently and what is the source?

Currently, the City has not budgeted for this project.
### 9. Other Potential Project Advantages

In addition to helping address flow targets and basin-wide flow issues (Endangered Species Act, Tribal Water Rights, Clean Water Act, etc.), briefly explain other potential benefits (e.g. reduced O&M costs, restores/mimics ecological processes, cropping flexibility, )

This project would add 3.97 CFS to Mill Creek during critical times for emergencies, operations, and low-flow fish passage issues. Also converting the VFD to a two way VFD will allow this project to generate electric power.

### 10. Other Potential Project Disadvantages

Briefly explain potential drawbacks of the proposal (e.g. reduced GW supply - recharge mitigation need, increased O&M costs, legal implications)

If this area is restored to historical artesian pressure, farmer's wells will have to be monitored and sealed if they leak due to artesian pressure. However, artesian pressure reduces pumping costs.

### 11. Estimated Time Frame to Implement Project?

The project will take 3 to 6 months to construct. The project will be upgraded to ASR if funds can be found.
1. **Title:** Improved delivery infrastructure – Replace leaky water pipes 2010-2070
   Table 1 – Use/conveyance efficiency project – 2B.

2. **Project Status:** Identify whether the proposed project is a past, ongoing or new project and briefly explain the status of the project, including the requested role of the Flow Study in further consideration of the project. If past project, some of the questions below may not be applicable.
   □ a. NEW PROJECT  X b. ON-GOING PROJECT  □ c. PAST PROJECT

   The City is generally replacing a mile of water system distribution pipe per year over 60 years at a cost of 60 million dollars.

3. **General Description of Proposal:** Identify the category(s) and briefly explain the proposed project (e.g. location, infrastructure requirements, maintenance requirements, connection to other new, ongoing or past projects, other stakeholders, various sizing or phasing, etc.).

   x a. Water Conservation & Infrastructure  □ b. Aquifer Recharge & Aquifer Storage and Recovery
   □ c. Surface – Groundwater Source Switch  □ d. Surface Water Storage  □ e. Pump Exchange
   □ f. Water Right Transactions  □ g. Point of Diversion Transfers  □ h. Other

   The City has two programs that replace water system pipes. The programs are the Infrastructure Repair and Replacement Plan (IRRP) and the Water System Capital Improvements Plan (CIP). The following information is from the 2016 IRRP Annual progress Report and gives an excellent overview of the program:

**Introduction**

The Infrastructure Repair and Replacement Plan (IRRP) has now completed its seventh year of construction. For those unfamiliar with the IRRP, this program was established by City Council in April 2010 to provide a systematic approach to replace the City’s three failing critical infrastructure systems: water, sewer, and streets. Of the 160 miles of failing infrastructure systems in the City, there are 43 miles where the water, sewer and streets are failing in the same locations. The IRRP is focused on replacing the infrastructure in these areas. The program is funded by utility revenues at an annual rate of approximately $5,000,000 per year. This annual progress report summarizes the achievements and costs of the previous years’ work.

**Progress Summary (2010-2016)**

<table>
<thead>
<tr>
<th>Projects</th>
<th>Miles Completed</th>
<th>Miles Remaining</th>
<th>Average Miles Replaced Per Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>6.2</td>
<td>36.8</td>
<td>0.88</td>
</tr>
</tbody>
</table>
### Infrastructure Replaced (2010-2016)

<table>
<thead>
<tr>
<th></th>
<th>2010-2014</th>
<th>2015</th>
<th>2016</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Main Replaced</td>
<td>22,895</td>
<td>3,920</td>
<td>7,602</td>
<td>34,417</td>
</tr>
<tr>
<td>Sewer Main Replaced</td>
<td>20,713</td>
<td>3,057</td>
<td>6,038</td>
<td>29,808</td>
</tr>
<tr>
<td>Street Replaced</td>
<td>22,175</td>
<td>3,775</td>
<td>6,700</td>
<td>32,650</td>
</tr>
<tr>
<td>ADA Ramps Installed</td>
<td>211</td>
<td>33</td>
<td>47</td>
<td>291</td>
</tr>
</tbody>
</table>

### Program Funding
- $19,000,354 spent to date on IRRP projects (2010-2016).
- In 2015, the IRRP Program paid back its initial start-up bond.

### 2016 Projects
In this past year, the City completed two IRRP projects which included:
- Alder Street – from Merriam Street to Roosevelt Street and;
- Chestnut Street – from Ninth Avenue to Second Avenue

The table below provides a summary of costs for the 2016 IRRP program year.

<table>
<thead>
<tr>
<th></th>
<th>Projected Cost</th>
<th>Actual Cost</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alder IRRP Project</td>
<td>$4,202,000</td>
<td>$3,572,718</td>
<td>($629,282)</td>
</tr>
<tr>
<td>Chestnut IRRP Project</td>
<td>$2,336,000</td>
<td>$2,023,060</td>
<td>($312,940)</td>
</tr>
</tbody>
</table>

The table below lists the improvements made in 2016 with IRRP funds.

<table>
<thead>
<tr>
<th></th>
<th>Alder IRRP Project</th>
<th>Chestnut IRRP Project</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Main Replaced</td>
<td>4,492</td>
<td>3,110</td>
<td>7,602</td>
</tr>
<tr>
<td>Sewer Main Replaced</td>
<td>3,700</td>
<td>2,338</td>
<td>6,038</td>
</tr>
<tr>
<td>Street Replaced</td>
<td>3,690</td>
<td>3,010</td>
<td>6,700</td>
</tr>
<tr>
<td>ADA Ramps Installed</td>
<td>30</td>
<td>17</td>
<td>47</td>
</tr>
</tbody>
</table>

### 2016 Quantitative Results
The 2016 IRRP projects replaced a total of 143 water services. Many of those were found to be leaking water when they were exposed during construction. During replacement of the sanitary sewer, inspection observed multiple areas of prolonged sewage leaks under the roadway. This was attributable to deteriorated pipes and joint separation. The elimination of both the water leaks and sewage exfiltration under the roadway will not only protect the roadway and soils underneath, but it will also reduce overall water loss. Along with the 6,038 linear feet of sewer main replaced, 154 sewer services were also replaced.

In addition, the Water System CIP program replace several failing water pipes each year that are not IRRP eligible projects.
4. Source of Produced Water: Mark all applicable and identify (water right number, shallow or deep basalt aquifer, stream name).

- □ a. Existing Water Right
- □ b. Groundwater
- □ c. Surface Water (Fixing all the leaky water distribution pipes in Walla Walla would potentially reduce withdrawal rate by 3\((+/-)\) cfs at the intake on Mill Creek)
- □ d. Other

5. City Municipal Water Supply Benefits

   a. City fill in categories: Reduction in water system leakage would improve flow and water quality in Mill Creek during the summer months.

   b. City fill in categories:

   c. City fill in categories: -

6. Instream Flow Benefits - Quantity/Timing/Location of Water Produced: Estimate average amount of water, when and where. Can the project be considered at various sizes(flow outputs) and/or considered in phases?

   a. Acre-feet and/or Cubic-feet-per-second: Fixing all the leaky water distribution pipes in Walla Walla would potentially reduce withdrawal rate by 3\((+/-)\) cfs year round at the intake on Mill Creek.

   b. Timeframe(s): Year-round benefit

   c. Stream Reach Location(s): The reach receiving extra flow would be from the City water system intake located at river mile 25.4, located in the pristine protected watershed, through the City of Walla Walla and to river mile 0 located at the confluence of the Walla Walla River. The Walla Walla River reach from the junction of Mill Creek to Columbia River would also benefit.

е. □ d. UNKNOWN - Need more work (engineering/design/modeling, etc.) to estimate potential instream flow outputs of the project. Will results of this work be concluded within one year to inform potential project flow outputs? Describe additional work needed and cost estimate. N/A
7. **Cost Estimates:** Provide known and estimated costs to develop and implement the project.

   a. **Project Development and Design:** $9 million

   b. **Project Construction:** $51 million

   c. Construction cost per AF and/or CFS: $18 million per CFS

   d. **Project Annual O&M:** N/A

   □ c. **UNKNOWN** - Need engineering/design work to estimate costs

8. **Secured Costs:** Has any funding been secured in the past or currently and what is the source?

   Currently, the City is budgeting and constructing these projects.

9. **Other Potential Project Advantages:** In addition to helping address flow targets and basin-wide flow issues (Endangered Species Act, Tribal Water Rights, Clean Water Act, etc.), briefly explain other potential benefits (e.g. reduced O&M costs, restores/mimics ecological processes, cropping flexibility, )

   These projects over the next 60 years would add up to 3 CFS to Mill Creek during critical times for emergencies, operations, and low-flow fish passage issues.

10. **Other Potential Project Disadvantages:** Briefly explain potential drawbacks of the proposal (e.g. reduced GW supply - recharge mitigation need, increased O&M costs, legal implications)

    Leakage has helped maintain the shallow aquifer and local streams. Reducing leakage could reduce local small stream flows, lower water table, stress local trees and impact local fish rearing.
<table>
<thead>
<tr>
<th>11. Estimated Time Frame to Implement Project?</th>
</tr>
</thead>
<tbody>
<tr>
<td>The project will require 60 years to fully implement.</td>
</tr>
</tbody>
</table>
# MILL CREEK WATER SUPPLY WORK GROUP

## PRELIMINARY PROJECT PROPOSAL TEMPLATE

<table>
<thead>
<tr>
<th>Title: City Stormwater upgrades</th>
</tr>
</thead>
<tbody>
<tr>
<td>Table 2.1.B – Complementary Projects– Stormwater upgrades</td>
</tr>
</tbody>
</table>

### 2. Project Status:
Identify whether the proposed project is a past, ongoing or new project and briefly explain the status of the project, including the requested role of the Flow Study in further consideration of the project. If past project, some of the questions below may not be applicable.

- □ a. NEW PROJECT
- X b. ON-GOING PROJECT
- □ c. PAST PROJECT

Each large City transportation project when possible upgrades the stormwater system.

### 3. General Description of Proposal:
Identify the category(s) and briefly explain the proposed project (e.g. location, infrastructure requirements, maintenance requirements, connection to other new, ongoing or past projects, other stakeholders, various sizing or phasing, etc.).

- □ a. Water Conservation & Infrastructure
- □ b. Aquifer Recharge & Aquifer Storage and Recovery
- □ c. Surface – Groundwater Source Switch
- □ d. Surface Water Storage
- □ e. Pump Exchange
- □ f. Water Right Transactions
- □ g. Point of Diversion Transfers
- □ h. Other

Each large City transportation project tries to upgrade the stormwater water system. Many of the existing stormwater systems discharge directly into local streams. These existing systems have no treatment component and discharge pollutants commonly found on local streets to local streams. The stormwater upgrades included with transportation projects generally remove direct stormwater connections to local streams. These project typically include point source pollution improvements, water quality treatment and groundwater infiltration components. This results in cool, clean continuous recharge to local streams and improved base stream flows.
4. Source of Produced Water: Mark all applicable and identify (water right number, shallow or deep basalt aquifer, stream name).

☐ a. Existing Water Right

☐ b. Groundwater

X c. Projects are ongoing every year. It is estimated that roughly over time, this will return up to 1 cfs of base flow to local creeks.

☐ d. Other

5. City Municipal Water Supply Benefits

a. City fill in categories: Mill Creek is listed a Total Maximum Daily Load (TMDL) creek for temperature, fecal, PCB’s and chlorinated pesticides. Treating stormwater flows will help reduce contamination and improve water quality.

b. City fill in categories:

c. City fill in categories:

6. Instream Flow Benefits - Quantity/Timing/Location of Water Produced: Estimate average amount of water, when and where. Can the project be considered at various sizes (flow outputs) and/or considered in phases?

a. Acre-feet and/or Cubic-feet-per-second: This will provide local streams and Mill Creek with a base flow of 1+/- cfs as the projects are implemented over the next 20+ years.

b. Timeframe(s): Year-round benefit

c. Stream Reach Location(s): The reach receiving extra flow would be from the city center to river mile 0 located at the confluence of the Walla Walla River. The Walla Walla River reach from the junction of Mill Creek to Columbia River would also benefit.

☐ d. UNKNOWN - Need more work (engineering/design/modeling, etc.) to estimate potential instream flow outputs of the project. Will results of this work be concluded within one year to inform potential project flow outputs? Describe additional work needed and cost estimate. N/A
7. **Cost Estimates:** Provide known and estimated costs to develop and implement the project.

   a. **Project Development and Design:** N/A

   b. **Project Construction:** $200,000 per year – big variation year to year, depending on grants received.

   c. **Construction cost per AF and/or CFS:** $4,000,000 for 1 CFS (assume 20 years to get there)

   d. **Project Annual O&M:** N/A

   □ c. **UNKNOWN** - Need engineering/design work to estimate costs

8. **Secured Costs:** Has any funding been secured in the past or currently and what is the source?

   The City has been very successful at getting stormwater Ecology grants. The effort is ongoing.

9. **Other Potential Project Advantages:** In addition to helping address flow targets and basin-wide flow issues (Endangered Species Act, Tribal Water Rights, Clean Water Act, etc.), briefly explain other potential benefits (e.g. reduced O&M costs, restores/mimics ecological processes, cropping flexibility, )

   These projects could add up to 1 CFS to Mill Creek during critical times for cool clear base flows benefiting fish during low-flow fish passage issues.

10. **Other Potential Project Disadvantages:** Briefly explain potential drawbacks of the proposal (e.g. reduced GW supply - recharge mitigation need, increased O&M costs, legal implications)

    Groundwater recharge will help local small stream flows, help the water table, improve water quality and improve local fish rearing and passage.
**11. Estimated Time Frame to Implement Project?**

The project will require 20 plus years to fully implement.
2. **Project Status:** Identify whether the proposed project is a past, ongoing or new project and briefly explain the status of the project, including the requested role of the Flow Study in further consideration of the project. If past project, some of the questions below may not be applicable.

- **□ a. NEW PROJECT**
- **X b. ON-GOING PROJECT**
- **□ c. PAST PROJECT**

In 2017 the City is installing approximately, 9,500 new water meters, 11,000 new radio transmitters, and 2 radio towers to read all meters automatically. Hourly meter data is collected. This hourly data can identify leaks beyond the meter and greatly help with conservation. The cost of the project is 6 million dollars.

3. **General Description of Proposal:** Identify the category(s) and briefly explain the proposed project (e.g. location, infrastructure requirements, maintenance requirements, connection to other new, ongoing or past projects, other stakeholders, various sizing or phasing, etc.).

- **x a. Water Conservation & Infrastructure**
- **□ b. Aquifer Recharge & Aquifer Storage and Recovery**
- **□ c. Surface – Groundwater Source Switch**
- **□ d. Surface Water Storage**
- **□ e. Pump Exchange**
- **□ f. Water Right Transactions**
- **□ g. Point of Diversion Transfers**
- **X h. Other**

The AMI system will read all water meters in the system automatically and record hourly water usage. This new system has already helped many consumers identify water leaks located on their property and identified high water uses the consumer is not aware of.

4. **Source of Produced Water:** Mark all applicable and identify (water right number, shallow or deep basalt aquifer, stream name).

- **□ a. Existing Water Right**

- **□ b. Groundwater**
X c. Surface Water (Fixing all the leaky water services lines beyond the meter and leaking fixtures such as leaking toilets in Walla Walla would potentially reduce withdrawal rate by 1 +/- cfs at the intake on Mill Creek)

☐ d. Other

<table>
<thead>
<tr>
<th>5. City Municipal Water Supply Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. City fill in categories: Help consumers with water loss and conservation</td>
</tr>
<tr>
<td>b. City fill in categories: Identify water leaks on private property.</td>
</tr>
<tr>
<td>c. City fill in categories: Provide the city with accurate water usage and billing.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>6. Instream Flow Benefits - Quantity/Timing/Location of Water Produced: Estimate average amount of water, when and where. Can the project be considered at various sizes (flow outputs) and/or considered in phases?</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Acre-feet and/or Cubic-feet-per-second: Installing AMI and fixing leaks, coupled with conservation and fixing property owners leaks is estimated to save 1 +/- cfs year round at the intake on Mill Creek.</td>
</tr>
<tr>
<td>b. Timeframe(s): Year-round benefit</td>
</tr>
<tr>
<td>c. Stream Reach Location(s): The reach receiving extra flow would be from the City water system intake located at river mile 25.4, located in the pristine protected watershed, through the City of Walla Walla and to river mile 0 located at the confluence of the Walla Walla River. The Walla Walla River reach from the junction of Mill Creek to Columbia River would also benefit.</td>
</tr>
<tr>
<td>☐ d. UNKNOWN - Need more work (engineering/design/modeling, etc.) to estimate potential instream flow outputs of the project. Will results of this work be concluded within one year to inform potential project flow outputs? Describe additional work needed and cost estimate. N/A</td>
</tr>
<tr>
<td>7. Cost Estimates: Provide known and estimated costs to develop and implement the project.</td>
</tr>
<tr>
<td>---</td>
</tr>
<tr>
<td>a. Project Development and Design: $6 million</td>
</tr>
<tr>
<td>b. Project Construction: $6 million</td>
</tr>
<tr>
<td>c. Construction cost per AF and/or CFS: $6 million per CFS</td>
</tr>
<tr>
<td>d. Project Annual O&amp;M: $200,000 (at least)</td>
</tr>
<tr>
<td>□ c. UNKNOWN - Need engineering/design work to estimate costs</td>
</tr>
</tbody>
</table>

| 8. Secured Costs: Has any funding been secured in the past or currently and what is the source? |
| The City is constructing/implementing this project. |

| 9. Other Potential Project Advantages: In addition to helping address flow targets and basin-wide flow issues (Endangered Species Act, Tribal Water Rights, Clean Water Act, etc.), briefly explain other potential benefits (e.g. reduced O&M costs, restores/mimics ecological processes, cropping flexibility, ) |
| This project would add up to 1 CFS to Mill Creek during critical times for emergencies, operations, and low-flow fish passage issues. |

| 10. Other Potential Project Disadvantages: Briefly explain potential drawbacks of the proposal (e.g. reduced GW supply - recharge mitigation need, increased O&M costs, legal implications) |
| N/A |

| 11. Estimated Time Frame to Implement Project? |
| The project is complete. |
G. CTUIR First Food River Visions Values
Appendix G: CTUIR First Food River Vision Values

The CTUIR Umatilla River Vision (River Vision) facilitates the sustained production of First Foods by establishing a vision for the desired ecological characteristics of a river. The River Vision requires a functional river to be “dynamic, and shaped not only by physical and biological processes, but [by] the interactions and interconnections between those processes”. The five key ecological characteristics (or touchstones) of functional rivers that are considered by the River Vision to be vital in the management and restoration of river ecosystems, and which are tied directly to the CTUIR’s First Food Mission, include hydrology, geomorphology, habitat and network connectivity, riverine biotic communities, and riparian vegetation. CTUIR River Vision (Jones et al. 2008). The CTUIR River Vision and related touchstones have been incorporated into the Mill Creek restoration recommendations contained in this report.

**CTUIR’s First Foods-Based River Vision to Guide Fisheries Restoration**

**Serving Order**

1. **Water**
2. **Salmon**
3. **Deer**
4. **Cous**
5. **Huckleberry**

**River Vision Touchstones:**

- Hydrology
- Geomorphology
- Connectivity
- Riparian Vegetation
- Aquatic Biota

**Goal:** Restored Floodplain and Increased First Foods for Tribal Use

**Hydrology:** Water is both a First Food, and a resource required to produce all other First Foods. A functional river requires preserving or restoring the seasonal timing and volumes of river
flows necessary to support the production and harvest of First Foods. Both water quantity and quality must be adequate to support the sustainable production of First Foods in terms of its physical properties (e.g., appropriate temperature regime); chemical composition (free of pollutants), biotic constituents (native biotic community), and hydrology (e.g., timing and volume of river flow and spatial distribution of water throughout a watershed).

**Geomorphology:** The river channel is naturally “anabranched” (having multiple channels separated by stable islands), like many of the remaining free-flowing alluvial rivers in the western U.S. At baseflow, the main channel frequently divides into multiple channels and then reconverges. Common geomorphic features within the bank-full scour zone include mid-channel and lateral bars and small spring channels. During peak discharge, flow in these multiple channels merge into a single main channel, while flood channels (which are inactive during baseflow) are activated, creating a different pattern of channel braiding. Channel structure is dynamic; in a natural state, the channels migrate laterally across the floodplain.

**Connectivity:** “Hydrologic connectivity” occurs longitudinally as tributaries flow into the larger river branches, laterally as river water during high flow events spreads out onto the adjacent floodplain (exchanging water between the main channel and secondary channels), and vertically as water moves bi-directionally between the river and underlying river gravels. Lateral connectivity is critical for maintaining biological diversity of floodplains and rivers. Longitudinal connectivity flushes fine sediments downstream to depositional areas, maintaining clean, coarse benthic gravels for macroinvertebrate habitat and spawning habitats for First Foods fishes. Vertical connectivity moves nutrients between the main channel and hyporheic zone, where microbes can remove nutrients, improving water quality. Lastly, connectivity creates routes for aquatic organisms to move between instream habitats and migrate throughout the river network.

**Riparian Vegetation:** A functional river encompasses a diverse community of self-sustaining wild populations of native riparian vegetation. Vegetation increases bank stability, becomes large wood inputs, and provides shade. A healthy riparian community also increases bank stability (reduces bank erosion). Large wood in the channel creates habitat complexity and pools for fishes, macroinvertebrates, and other aquatic biota. Shade by riparian vegetation
reduces solar radiation, potentially creating localized pockets of thermal refugia for aquatic organisms. Leaf litter inputs that are basal resources for the river’s food web, and habitats for riparian and aquatic organisms. All these functions contribute to promoting First Foods, such as surface water, salmon, steelhead, trout, lamprey, freshwater mussels and other native aquatic biota.
H. Ongoing Complementary Projects
Appendix H: Ongoing Complementary Projects

In near and long-term, implementation of the following Walla Walla Basin water and floodplain habitat enhancement projects are designed to complement the Mill Creek water restoration actions recommended in this report.

1. Water Projects
   A. Bi-State Integrated Flow Enhancement Project

   The purpose of the Walla Walla Basin Integrated Flow Enhancement Study is to determine the best package of options for increasing streamflow in the Walla Walla Basin for native fish, while maintaining the long term viability and water availability for irrigated agriculture, residential, and urban use. The primary outcome is intended to be a water management plan, based on the results of the feasibility study, with broad support for implementation to improve and protect stream flows across the Walla Walla Basin. Walla Walla River flow targets are 150cfs through early summer and 65 cfs throughout the summer. If Gardena Farms ID is exchanged with Columbia River water, the Yellowhawk diversion would be reduced (and Mill Creek flows increased) about 5-10cfs.

   B. Stormwater Upgrades

   A larger percentage of the City stormwater system discharges directly into Mill Creek or other local streams. Major transportation projects include a stormwater component. Often the direct connection to the local stream is removed and the water is treated with methods such as grass swales and infiltrated into the shallow aquifer. This results in cold clear returns to local streams helping to improve water quality and quantity.

   C. Bennington Lake Management Change

   Discussions are ongoing with the USACE to determine if existing Bennington Lake operations could be modified so that annual storage releases into the Walla Walla River in the spring could instead be released into Mill Creek during a period most beneficial for fish flow needs. Discussions will also include consideration of potential storage expansion for increased flood control and fish flow releases. The feasibility of these actions is not known at this time.

2. Fish Passage and Habitat/floodplain Enhancement Projects
   A. Diversion Dams
Juvenile and/or adult fish passage improvement is needed at the City intake, Bennington and Division dams on Mill Creek. Bennington and Division dams operated by the USACE have been particularly identified as major fish passage impediments that need to be addressed. These projects have been in the planning stage for years with the exact timing of funding unknown. When completed, these fish passage improvements will complement other projects which increase instream flows for fish.

B. Concrete Channel Enhancement
The concrete channel portion of Mill Creek through town has received some improvements for reducing water velocity and increasing resting pools to assist fish migration. More work will be necessary in the near term. It is anticipated that a longer term channel re-design to benefit multiple purposes may eventually supersede the current concrete channel near term projects.

C. Floodplain Restoration
The Mill Creek Assessment and Strategic Action Plan (CTUIR 2017) analyzes various approaches for achieving a more natural stream channel. Possible actions include levee removal or setback and removal of weirs to benefit multiple purposes such as fish, flood control, stream “green way”/esthetics, recreation, etc. Stakeholder groups are being organized and are meeting to identify programs and funding to implement improvements.

D. USACE GI Study
Funds are being sought to study improved lower Mill Creek flood control with intent to integrate with the other Mill Creek channel improvements discussed above. It is unknown if and when USACE funding may be approved.

E. More Restrictive Floodplain Land Development and Use
Current streambank land use and ongoing developments are not consistent with the potential future plans (described above) to create a more natural Mill Creek “green-way” type channel. County and City land use and zoning regulations must be examined and possible modified to increase floodplain protection and minimize new developments which continue or further restrict the Mill Creek channel. Planning for this should begin immediately.

3. Flow and Fish Monitoring Projects

A. Flow Monitoring
To more comprehensively provide baseline data for enhancing streamflows, CTUIR plans to work with the City to install a stream gage above the City’s point of Diversion on Mill Creek. This information will be used to complement downstream gaging data collected by the City, as well as the metering of the City’s diversion itself.

B. Fish Return Monitoring and Reporting
As new passage and fish counting facilities are constructed at Bennington Dam (better fish information becomes available), CTUIR plans to coordinate with the US Army COE to compile and periodically update adult fish return information for public dissemination. Stream flow and fish return information along with progress reports on implementation of projects recommended in this report are anticipated to be made publicaly available on the internet, local newspapers and the City of Walla Walla monthly news publication.