DRAFT - WALLA WALLA BASIN INTEGRATED FLOW ENHANCEMENT STUDY

PRELIMINARY PROJECT PROPOSAL TEMPLATE

1. Title: ASR to Replace Surface Diversion: Surface Water Source	**2. Proposal Preparer(s):**

3. 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

The new project described herein is intended to serve as a template for any potential future basalt ASR project that has the basic following elements: (1) goal - use the basalt aquifer to store winter/spring water for summer delivery to an irrigation system using surface water so that those summer surface flows are left in stream, (2) source of stored water – winter/spring flows in a nearby targeted stream, (3) winterized diversion/pumping station on stream and basalt injection/recovery well(s) need to be retrofitted or purpose built, (4) project likely collocated with existing irrigation infrastructure and (5) Flow Study stakeholders will work with regulators and other stakeholders to identify potential existing water rights that could be used for the project and/or gain support for new water rights.

4. 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 x c. Surface – Groundwater Source Switch** □ d. Surface Water Storage □ e. Pump Exchange □ f. Water Right Transactions □ g. Point of Diversion Transfers **x h. Other (stream flow/habitat restoration)**

Basic Hypothetical Project Description: This type of project would focus on storing water in the basalt aquifer for later delivery to an existing irrigation project that normally uses a surface water source. The delivered stored water would replace the surface diversion. Water would be diverted from a stream, routed through some sort of treatment system (to be determined based on source water chemistry and turbidity), and injected in to the basalt aquifer via a basalt aquifer well(s). Stored water would then be recovered from a basalt well(s) and delivered to the irrigation project. Stored water would be geochemically compatible with native basalt groundwater and storage would not degrade native groundwater for other uses. The direct benefits of such a flow enhancement project would be measured by the volume and rate of water remaining in a stream or stream reach as a result of not using the surface diversion.

No projects such as this currently exist in the project area. Given that, infrastructure for water diversion, treatment and delivery to the basalt aquifer and streams would need to be built or modified for any project. Also, one or more new wells likely will need to built for a particular project given the scarcity of existing wells that are suitable for, or easily reconfigured for, basalt ASR use.

To use a stream as a source for basalt ASR a project needs:

- Pumping station on the stream in question, including fish screening depending on the stream in use.
- Pumping station needs to be capable of winter operations.
- Distribution system to move source water from the diversion/pumping station to the selected ASR injection well.
- Treatment system to ensure that native groundwater is not degraded by injected source water. Depending on source water quality, treatment may include disinfection, geochemical treatment, and/or filtration.

Source water and native groundwater should be geochemically compatible so that their mixing does not result in reactions that reduce porosity/permeability in the basalt aquifer, so that the recovered water is compatible with its intended use, and so that potable uses of the basalt aquifer are not impaired. This will be addressed prior to the start of pilot testing via sample collection and analysis to establish potential compatibility and/or incompatibility. Early in an ASR project pilot testing of geochemical compatibility will be further evaluated via short duration injection/recovery tests.

Source water will need to be delivered to an ASR well(s) via a pipeline delivery system, either existing, refurbished, or purpose built. An existing pipeline system capable of delivering source water to an ASR well likely does not currently exist because that activity is not currently being done in the project area. However, it might be possible to refurbish an existing delivery system. A refurbished delivery system, would at a minimum, need valving to direct water from the source towards the ASR well, and from the ASR well to the point/location of eventual use. This minimum refurbishment would assume that pipelines are already located and sized to accommodate the back and forth transmission of source water towards the ASR well and delivery to a point of use. If such is lacking, refurbishment would require installation of additional infrastructure to meet operational needs. In addition, refurbishment would require installation of necessary treatment. A purpose built system would include all pumps, pipes, and controls to move the desired water volumes at the desired rates from the source, to the ASR well, and from the ASR well to its point(s) of use. In any of these cases wellhead and/or in-well infrastructure will be needed to control injection rate and prevent oxygenation of the injection water column.

A basalt ASR well, either existing or purpose built, will be needed for a successful project. Basic criteria that should be evaluated when determining if a purpose built well or an existing well is suitable for an ASR project include: (1) depth the well penetrates into basalt, (2) difference between the depth to top of basalt and the bottom of casing, (3) open interval length, (4) minimum diameter, (5) difference between the bottom of casing and static water level, and (6) specific capacity. In addition to these criteria, an ASR well should be compliant with the water supply well construction rules described in WAC 163-170.

Recovered water generally will be delivered for its intended use via a pipeline delivery system, either existing, refurbished, or purpose built. Since the intended use of recovered water is irrigation, the need for new infrastructure can be minimized by placing the ASR well(s) in close proximity to the existing surface diversion.

In any of these cases wellhead and/or in-well infrastructure will be needed to control recovery and distribution of the stored water.

Hypothetical Project Size and Design Estimates: Because a specific project site has not yet been selected we cannot at this time propose design and cost estimates for a specific project. Given that, this section describes basic design elements and associated estimated construction cost, as follows:

- Site specific hydrologic characterization work needs to be done to support development of this option. Characterization results will provide the technical basis upon which a decision to proceed will in part be based.
- New surface water diversion, approximate capacity 2,000 gpm, 4.4 cfs, or 8.8 acre-ft/day. Needs to be winterized and it would include fish screening and source water treatment, including filtration

and disinfection. Assume approximately 100 days of operation, yielding approximately 880 acre-feet of treated source water. Additional treatment needs would be defined by characterization.

- Source water delivery piping would be minimized by placing basalt ASR well near the creek as the creek is where recovered water gets delivered to.
- ASR well, assumed to be approximately 1,000 feet deep, including 600 foot cased and sealed interval and 400 foot, 16-inch diameter open-hole interval. In-well pump/valving needs to accommodate both injection and recovery. Well design capacity approximately 2,000 gpm, 4.4 cfs, or 8.8 acre-ft/day injection and with approximate maximum recovery on the order of 2,500 gpm, 5.5 cfs, and 11 acre-ft/day recovery.
- At a recovery rate of 11 acre-feet/day 90% of the annual stored water volume (792 of 880 acre-feet) could be recovered in approximately 72 days.
- Piping to deliver recovered water back to the targeted irrigation system.
- Additional capacity might be developed by enlarging the surface diversion and/or intertying multiple basalt ASR wells, if hydrologic characterization shows that this is feasible.

Assuming 880 acre-feet of stored water and 90% recovery of that water each year, during a 20 year life cycle for the project, total stored/recovered water is 15,840 acre-feet.

Additional annual project elements would include: (1) operations and maintenance (O&M) which are in part controlled by equipment life cycles, power to operate (which can fluctuate), and well pumping characteristics and (2) monitoring and reporting requirements which are based on permit conditions.

5. 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: Water right(s) will depend on a specific, yet to be determined, project location. At a minimum water rights to surface water will need to be acquired through transfer or new permit. In addition, a permit to access stored water will need to be acquired. Because there is no consumptive use of water, it's diverted, stored, and resupplied to targeted stream, a water rights portfolio may target transfers as a preferred approach.

□ d. Other

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

<u>a. Acre-feet and/or Cubic-feet-per-second:</u>

- Maximum of 880 acre-feet of water withdrawn from the targeted stream, stored in basalt aquifer.
- 90% recovery of that stored water, at a recovery rate of 11 acre-feet/day 90% of the annual stored water volume equals 792 acre-feet.

<u>b. Timeframe(s):</u>

- Stream water withdrawal, 110 days of operation during approximate timeframe of December 1 through May 15, each season.

- Recover stored water from basalt aquifer, 80 days of operation during period of June 1 through September 30, each season.

c. Stream Reach Location(s):

- Yet to be determined.

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

A specific site needs to be identified and access to it secured. Need for additional work will be determined based on that final selection.

7. Ability to Protect Produced Water Instream: *Briefly explain how the produced water will be quantified, monitored and protected instream or why it is not currently protectable.*

□ a. YES - protection under existing regulations expected to WW River mouth or in limited reach?

□ b. NO or □ c. UNKNOWN – Results and implementation of flow protection study likely necessary to ensure flow protection.

Cannot be done until a site specific project is identified.

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

a. Project Development and Design: Basic project outline developed, site specific work remains to be done, pending identification of a specific project.
Approximate planning level cost estimate: $75,000 +/-25%.

b. Project Construction: ***Approximate planning level cost estimate: $1,635,000 +/-25%.***

c. Construction cost per AF and/or CFS: ***Approximate planning level cost estimate: $2,064.40 acre-foot,*** or over a 20 year life cycle for the project, total stored/recovered water is 15,840 acre-feet and ***annual per acre-foot capital cost $103.22 +/- 25%.***

d. Project Annual O&M: ***Approximate planning level cost estimate: $37,200 to $70,000, or $47 to $88 per acre-foot,*** at the design size described above.

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

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

None

10. 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,)*
Indirect flow enhancement benefits might accrue from enhanced stream flows supporting existing active surface diversions that do not reduce stream flows below specified targets. In addition, by recharging the basalt aquifer system there is the potential for indirect benefits associated with reversing groundwater level declinces, such as reducing pumping lift for existing basalt water rights or potentially enhancing base flow to streams.
11. 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)*
12. Estimated Time Frame to Implement Project?
Year 1 to 2: Locate specific site, conduct final design and permitting, identify and secure water rights. Year 2 to 3: Construction and testing. Years 3 to 5: Operational refinement, followed by final operational permit and long-term operations.