**Walla Walla Basin Bi-State Flow Enhancement Study - Package Summary Forms**

**PACKAGE ALTERNATIVE #1**

**Large Columbia River Pump Exchange**

**General Description -** Pump approximately 33K AF of Columbia River water from Lake Wallula near the mouth of the Walla Walla River to fully exchange WWRID/HBDIC, GFID and Lowden 4 irrigation systems thereby leaving instream the exchanged quantities plus water efficiencies gained. This alternative is 7,843K AF short of meeting target flows.

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| **PROJECT COMPONENT** | **PROJECT CRITERIA** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **1. Flow Output Reliable/ Manageable?** | **2. Flow Output Detectable/**  **Measurable?** | **3. Flow Output Necessary for Target?** | **4. Primary & Secondary**  **Project Benefits?** | | | | | | | **5. Cost Est:**  **1. total**  **2. unit**  **3. O&M** | **6.a. Cumulative Mgt. Points Where Long-Term (150/100)**  **Flow Targets Met?** | | | | | | | | **6.b. Cumulative Mgt. Points Where Hybrid (150/100/65)**  **Flow Targets Met?** | | | | | | | |
| **ISF** | **GWR** | **AG** | **REC** | **RLR** | **?** | **?** |
| WWRID/HBDIC + GFID + Lowden 4  Columbia Exchange | Yes | Yes | Yes | X | X | ? | X | X |  |  | 1. ~$170,000,000  2. ~$5152/ AF  3. ~$4,300,000 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|  |  |  |  |  |  |  |  |  |  |  | 1.  2.  3. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|  |  |  |  |  |  |  |  |  |  |  | 1.  2.  3. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|  |  |  |  |  |  |  |  |  |  |  | 1.  2.  3. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |

**Total initial cost of construction/purchase: ~$170,000,000 O&M cost for 20 years: ~86,000,000**

**PACKAGE ALTERNATIVE #2 Large Columbia River Pump Exchange + Miscellaneous Projects**

**General Description -** Same as alternative #1 with the addition of several smaller projects. These could potentially address most of the 7,843 K AF shortfall, but further study is needed to confirm if these additional projects would achieve the quantity, location and timing for meeting the flow gaps.

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| **PROJECT COMPONENT** | **PROJECT CRITERIA** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **1. Flow Output Reliable/ Manageable?** | **2. Flow Output Detectable/**  **Measurable?** | **3. Flow Output Necessary for Target?** | **4. Primary & Secondary**  **Project Benefits?** | | | | | | | **5. Cost Est:**  **1. total**  **2. unit**  **3. O&M** | **6.a. Cumulative Mgt. Points Where Long-Term (150/100)**  **Flow Targets Met?** | | | | | | | | **6.b. Cumulative Mgt. Points Where Hybrid (150/100/65)**  **Flow Targets Met?** | | | | | | | |
| **ISF** | **GWR** | **AG** | **REC** | **RLR** | **?** | **?** |
| 1. LWWRID/HBDIC + GFID + Lowden 4  Columbia Exchange | Yes | Yes | Yes | X | X | ? | X | X |  |  | 1. ~$170,000,000  2. ~$5152/ AF  3. ~$4,300,000 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2. MAR targeted for Instream Return Flow (TBD) – 5cfs? |  |  |  |  |  |  |  |  |  |  | 1.~$1,400,000  2.~$97/AF  3.~$178,000 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 3. Maximum MAR - 5+ cfs? |  |  |  |  |  |  |  |  |  |  | 1.~$5,100,000  2.~$211/AF  3.~$740,000 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 4. . ASR – above MF, Pepper, Beet - 2 cfs? |  |  |  |  |  |  |  |  |  |  | 1.~$3,000,000  2.~$1056/AF  3.~$48,000 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 5. Telemetry – 2 cfs? |  |  |  |  |  |  |  |  |  |  | 1.~$143,000  2.~$199/AF  3.~$29,000 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 6. Water Market - 1cfs? |  |  |  |  |  |  |  |  |  |  | 1.~$500,000  2.~$1388/AF  3.~$5000 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |

**Total initial cost of construction/purchase: ~$180,143,000 O&M for 20 years: ~$106,000,000**

**ALTERNATIVE #3**

**Medium Pine Creek Storage**

**General Description** - Construct a 42K AF reservoir in lower Pine Creek and use 39K AF of active storage (leave 3K minimum pool) for WWRID/HBDIC, GFID and Lowden 4 irrigation systems thereby leaving instream the exchanged quantities plus water efficiencies gained. This single project component would achieve target instream flows.

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| **PROJECT COMPONENT** | **PROJECT CRITERIA** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **1. Flow Output Reliable/ Manageable?** | **2. Flow Output Detectable/**  **Measurable?** | **3. Flow Output Necessary for Target?** | **4. Primary & Secondary**  **Project Benefits?** | | | | | | | **5. Cost Est:**  **1. total**  **2. unit**  **3. O&M** | **6.a. Cumulative Mgt. Points Where Long-Term (150/100)**  **Flow Targets Met?** | | | | | | | | **6.b. Cumulative Mgt. Points Where Hybrid (150/100/65)**  **Flow Targets Met?** | | | | | | | |
| **ISF** | **GWR** | **AG** | **REC** | **RLR** | **?** | **?** |
| Medium Pine Creek  Storage Reservoir | Yes | Yes | Yes | X | ? | ? | X | X |  |  | 1. ~$355,000,000  2. ~$7,000/AF  3. ~$640,000 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|  |  |  |  |  |  |  |  |  |  |  | 1.  2.  3. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|  |  |  |  |  |  |  |  |  |  |  | 1.  2.  3. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|  |  |  |  |  |  |  |  |  |  |  | 1.  2.  3. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |

**Total cost of construction/purchase: ~$355,000,000 O&M for 20 years: ~$** **12,800,000**

**ALTERNATIVE #4 Small Pine Creek Storage + Miscellaneous Projects**

**General Description -** Construct a 36K AF reservoir in lower Pine Creek and use 33K AF of active storage (leave 3K minimum pool) for WWRID/HBDIC, GFID and Lowden 4 irrigation systems thereby leaving instream the exchanged quantities plus water efficiencies gained. The difference between alternatives #3 & #4 is 6,000 AF less storage which could potentially be provided by the additional projects. However, further study is needed to determine if these additional projects would produce 6,000 AF at the necessary location and timing for meeting the flow targets.

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| **PROJECT COMPONENT** | **PROJECT CRITERIA** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **1. Flow Output Reliable/ Manageable?** | **2. Flow Output Detectable/**  **Measurable?** | **3. Flow Output Necessary for Target?** | **4. Primary & Secondary**  **Project Benefits?** | | | | | | | **5. Cost Est:**  **1. total**  **2. unit**  **3. O&M** | **6.a. Cumulative Mgt. Points Where Long-Term (150/100)**  **Flow Targets Met?** | | | | | | | | **6.b. Cumulative Mgt. Points Where Hybrid (150/100/65)**  **Flow Targets Met?** | | | | | | | |
| **ISF** | **GWR** | **AG** | **REC** | **RLR** | **?** | **?** |
| Small Pine Creek  Storage Reservoir | Yes | Yes | Yes | X | ? | ? | X | X |  |  | 1. ~$325,000,000  2. ~$8,700/AF  3. ~$560,000 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2. MAR targeted for Instream Return Flow (TBD) – 5cfs? |  |  |  |  |  |  |  |  |  |  | 1.~$1,400,000  2.~$97/AF  3.~$178,000 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 3. Maximum MAR - 5+ cfs? |  |  |  |  |  |  |  |  |  |  | 1.~$5,100,000  2.~$211/AF  3.~$740,000 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 4. . ASR – above MF, Pepper, Beet - 2 cfs? |  |  |  |  |  |  |  |  |  |  | 1.~$3,000,000  2.~$1056/AF  3.~$48,000 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 5. Telemetry – 2 cfs? |  |  |  |  |  |  |  |  |  |  | 1.~$143,000  2.~$199/AF  3.~$29,000 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 6. Water Market - 1cfs? |  |  |  |  |  |  |  |  |  |  | 1.~$500,000  2.~$1388/AF  3.~$5000 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |

**Total cost of construction/purchase: $335,143,000 O&M for 20 years: ~$** **31,200,000**

**ALTERNATIVE #5**

**Small Storage + Medium Exchange**

**General Description** - Pump approximately 6K AF of Columbia River water from Lake Wallula near the mouth of the Walla Walla River to fully exchange GFID and Lowden 4 irrigation systems thereby leaving instream the exchanged quantities plus water efficiencies gained. In addition, construct a 36K AF reservoir in lower Pine Creek and use 33K AF of active storage (amount necessary to meet instream flow targets) for WWRID/HBDIC irrigation districts thereby leaving instream the exchanged quantities plus water efficiencies gained. These two project components would achieve target instream flows.

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| **PROJECT COMPONENT** | **PROJECT CRITERIA** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **1. Flow Output Reliable/ Manageable?** | **2. Flow Output Detectable/**  **Measurable?** | **3. Flow Output Necessary for Target?** | **4. Primary & Secondary**  **Project Benefits?** | | | | | | | **5. Cost Est:**  **1. total**  **2. unit**  **3. O&M** | **6.a. Cumulative Mgt. Points Where Long-Term (150/100)**  **Flow Targets Met?** | | | | | | | | **6.b. Cumulative Mgt. Points Where Hybrid (150/100/65)**  **Flow Targets Met?** | | | | | | | |
| **ISF** | **GWR** | **AG** | **REC** | **RLR** | **?** | **?** |
| Small Pine Creek  Storage Reservoir | Yes | Yes | Yes | X | ? | ? | X | X |  |  | 1. ~$325,000,000  2. ~$8,700/AF  3. ~$560,000 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| GFID + Lowden 4  Columbia River Exchange | Yes | Yes | Yes | X | X | ? | X | X |  |  | 1.~$75,000,000  2.~$500/AF  3.~$1,200,000 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|  |  |  |  |  |  |  |  |  |  |  | 1.  2.  3. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|  |  |  |  |  |  |  |  |  |  |  | 1.  2.  3. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |

**Total cost of construction/purchase: ~$400,000,000 O&M for 20 years: ~$35,200,000**

**POTENTIAL PROJECT ADD-ONS TO PACKAGE ALTERNATIVES**

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| **PROJECT**  **CONSIDERATIONS** | **PROJECT CRITERIA** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **1. Flow Output Reliable/ Manageable?** | **2. Flow Output Detectable/**  **Measurable?** | **3. Flow Output Necessary for Target?** | **4. Primary & Secondary**  **Project Benefits?** | | | | | | | **5. Cost Est:**  **1. total**  **2. unit**  **3. O&M** | **6.a. Cumulative Mgt. Points Where Long-Term (150/100)**  **Flow Targets Met?** | | | | | | | | **6.b. Cumulative Mgt. Points Where Hybrid (150/100/65)**  **Flow Targets Met?** | | | | | | | |
| **ISF** | **GWR** | **AG** | **REC** | **RLR** | **?** | **?** |
| 1. MAR targeted for Instream Return Flow (TBD) – 5cfs? |  |  |  |  |  |  |  |  |  |  | 1.  2.  3. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 2. Maximum MAR - 5+ cfs? |  |  |  |  |  |  |  |  |  |  | 1.  2.  3. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 3. ASR – above MF, Pepper, Beet - 2 cfs? |  |  |  |  |  |  |  |  |  |  | 1.  2.  3. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 4. Telemetry – 2 cfs? |  |  |  |  |  |  |  |  |  |  | 1.  2.  3. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 5. Water Market - 1cfs? |  |  |  |  |  |  |  |  |  |  | 1.  2.  3. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 6. HBDIC White Ditch Pipe – 10 cfs? |  |  |  |  |  |  |  |  |  |  | 1.  2.  3. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 7. Upper GFID Piping  10cfs |  |  |  |  |  |  |  |  |  |  | 1.  2.  3. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 8. Lowden 4 Piping – 2cfs? |  |  |  |  |  |  |  |  |  |  | 1.  2.  3. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |

**ADDITIONAL ONGOING/POTENTIAL PROJECTS IN WALLA WALLA BASIN THAT WILL COMPLIMENT THE Bi-STATE FLOW ENHANCEMENT PROJECT**

|  |  |  |  |
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| **Project** | **BRIEF DESCRIPTION & BENEFITS** | **STATUS/ENTITIES** | **TIMELINE** |
| City of WW municipal system upgrades | Various potential changes in water management such as Mill Creek diversion changes and distribution piping efficiencies will create water savings, some of which may be designated for increased instream flows. | City of WW, CTUIR and WDFW are drafting an action plan | Plan in 2017;  Implementation next 10-20 yrs. |
| Nursery Bridge reach channel restoration | Setting back the levee system and creating a more natural channel will allow for increased stream sinuosity, sediment sorting and streambed sealing, thereby potentially reducing the extreme seepage of stream flow in this critical reach. | Ph I immediately below NBD completed; CTUIR and WWBWC planning/ design with BPA & OWEB funds (need more COE) | 2017 - Ph II design and Ph III prelim design. Will need $ impl. |
| Lower Touchet pump-loop project | Water from the mainstem Walla Walla River just below the mouth of the Touchet River could be pumped to Touchet East/West Irrigation Districts thereby allowing the Touchet River to stay instream in the lower 2 miles. The Bi-State Flow Project would enhance fish passage to the confluence of the Touchet River and this project would further enhance fish access upstream into the entire Touchet Basin. | Discussion stage; may be a potential local water plan under W3MP | Unknown |
| GFID pump loop project | GFID leaves 10 cfs in river at the Burlingame diversion and pumps that water out near Touchet and pipes it up to Gardena Hill. There are existing pumps and pipes in place that divert water up to Gardena Hill, but a new pump and pipe set up may be necessary for the increased water capacity. | GFID/WWBWC/BPA | Initial designs/ costing in 2017 |
| More? |  |  |  |
|  |  |  |  |
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