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# Process Flow Plan

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Henry M. Jackson Hydroelectric Project (FERC No. 2157)

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Public Utility District No. 1 of Snohomish County



**September 2010**

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Appendix 1	Proposed License Article A-LA 8
Appendix 2	Consultation Documentation
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# ACRONYMS

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ARC	Aquatic Resource Committee
District	Public Utility District No. 1 of Snohomish County
FERC	Federal Energy Regulatory Commission
LWD	Large woody debris
MW	Megawatt
PF	Process flow
PM&E	Protection, mitigation and enhancement
RSP	Revised Study Plan
USGS	United States Geological Survey

## 1. INTRODUCTION

### 1.1. Background

The Public Utility District No. 1 of Snohomish County (District) is seeking from the Federal Energy Regulatory Commission (FERC) a new license for the existing 111.8-megawatt (MW) Henry M. Jackson Hydroelectric Project (FERC No. 2157) (Project). The current license expires on May 31, 2011. The Project is located on the Sultan River in Snohomish County, Washington, near the City of Sultan. The Project was originally licensed in 1961 and amended in 1981. In 1964, construction of Culmback Dam was completed to create Spada Reservoir – the source of the majority of drinking water supplied to Snohomish County by the City of Everett. In 1984, construction of the Project as it exists today was completed. The Project includes a 262-foot high rock-fill dam (Culmback Dam); a 1,870-acre reservoir (Spada Lake or Spada Reservoir) operated for the City of Everett’s water supply, fisheries habitat enhancement, hydroelectric power, and incidental flood control; a Powerhouse and various other facilities; wildlife mitigation lands; and several developed and undeveloped lake recreation and river access sites.

On October 14, 2009, the District filed a comprehensive settlement agreement (Settlement Agreement) on behalf of itself, National Marine Fisheries Service, United States Forest Service, United States Fish and Wildlife Service, United States National Parks Service, Washington Department of Fish and Wildlife, Washington Department of Ecology, the Tulalip Tribes of Washington, the City of Everett, Snohomish County, the City of Sultan and American Whitewater (collectively referred to as “Settlement Parties”). The Settlement Agreement resolved among the signatories all issues associated with issuance of a new license for the Project, including reservoir operation, minimum instream flows, process flows, whitewater boating flows, ramping rates, fish passage, fish habitat improvements, wildlife habitat management, marbled murrelet protection measures, recreation, historic properties and license term.

The Settlement requests that the Commission adopt, without material modification, several Proposed License Articles. These Proposed License Articles will implement a complex and interrelated suite of protection, mitigation and enhancement measures that will result in improved resource conditions and ecological processes in the Sultan River over the term of a new license. The Proposed License Articles mainly address flows, fish passage, fish and wildlife habitat enhancement and protection, water quality, municipal water supply, rule curves for reservoir operation, fish supplementation, recreation, historic properties, and noxious weeds.

Proposed Aquatic License Article (A-LA) 8 provides for the development of this Process Flow Plan (PF Plan, or Plan) (Appendix 1). The District consulted with the Aquatic Resource Committee (ARC) on the development of the draft PF Plan; documentation of consultation opportunities is included in Appendix 2.

### 1.2. Purpose

This PF Plan is based primarily on the results of the Revised Study Plan 22 Physical Process Study (Stillwater 2009), Revised Study Plan 23 Indicators of Hydrologic Alteration/Range of Variability in the Sultan River (R2 2008) and the subsequent development of protection, mitigation, and enhancement (PM&E) measures during settlement agreement negotiations. The purpose of the Plan is to outline the schedule and frequency for providing flows of specific magnitude and duration to meet desired aquatic resource objectives. These flows will be met primarily through periodic controlled project releases from Culmback Dam, the City of Everett’s Diversion Dam, and the Powerhouse. When possible, these

releases will be sequenced to occur with heavy rainfall (accretion) to achieve flows of greater magnitude. Spill events may also contribute to achieving the aquatic resource objectives.

This PF Plan includes provisions that describe:

1. the frequency, magnitude, duration, and timing of process flow components;
2. the ongoing involvement of the ARC in implementing this program;
3. the mechanism for timing controlled flow releases (including whitewater boating releases pursuant to the Whitewater Recreation Plan) to coincide with rainfall events or uncontrolled flow releases to achieve the frequency, magnitude, and duration for each of the process flow components;
4. the timing and other restrictions necessary to minimize impacts to aquatic resources and to not exacerbate downstream flood damage in the City of Sultan;
5. the method, locations, and schedule for monitoring and measuring process flow components;
6. the method and schedule for studying the necessity of flushing flows for supporting the geomorphic process goals;
7. the method and schedule for studying the necessity of upstream migration flow and outmigration flow for providing timely and effective upstream and downstream migration of anadromous fish; and
8. the method and schedule for monitoring the impacts of process flow upon physical habitat and aquatic resources.

### **1.3. Goals and Assumptions**

When developing the proposed process flow PM&E during settlement negotiations, there was scientific uncertainty among the Aquatic Resource Settlement Group on the need for, the magnitude, and the duration of various process flow components requiring releases above and beyond what already occurs from the Project and what occurs naturally. The following assumptions were made during settlement negotiations and through the monitoring components will be studied to determine the cost/benefit and necessity of providing or modifying such flows to improve habitat conditions in the Sultan River.

The channel forming, channel maintenance, and flushing flows outlined in the proposed license article will likely contribute to the:

- formation and re-distribution of physical habitat features including riffles, pools, runs, and point bars;
- effective transport, sorting, and distribution of LWD and sediment,
- alteration of channel features including increased lateral channel movement and improved connectivity between mainstem and side channel habitats,
- creation of undercut banks; and
- the removal of interstitial fine sediment from spawning gravels.

In addition to initiating changes to in-channel habitat, regular process flows are expected to slightly alter the channel form, and limit riparian vegetation encroachment (Leopold 1964). The magnitude, duration, and frequency of flows required to achieve the desired resource objectives are not an exact certainty. Monitoring will provide information on effectiveness and the interplay of these three flow parameters in meeting the intent of the license article.

Although extreme high magnitude flow events during the salmon and steelhead incubation period have been linked with reduced egg-to-fry survival, short duration flow events of lesser magnitudes (pulsed flows) in the spring may trigger juvenile salmonid outmigration and increase survival. Short duration high flow events in the late summer and fall are known to initiate the upstream migration of adult salmon, limit straying to other river basins, and facilitate swimming past natural and artificial barriers. Overall, implementing the District's proposed juvenile outmigration and adult upstream migration flow releases will provide elements of a more normative hydrograph in the lower Sultan River compared to existing conditions. These elements are expected to increase the survival of juvenile salmon and steelhead outmigrants and may also facilitate upstream migration of returning adults.

Effective upstream migration flow (A-LA 8 Section 4) and outmigration flow (A-LA 8 Section 5) can occur over a wide range of magnitudes. For example, A-LA 8 Section 4.1 specifies that the upstream migration is achieved when a minimum flow between 800 and 1,200 cfs as determined by the ARC is maintained or exceeded for six (6) consecutive hours. By providing a range, the Settlement Parties intend that the District, in consultation with the ARC, will test different flow magnitudes within that range during the first ten years of the License. At the end of this initial period and based upon that testing, the Settlement Parties intend that the District, in consultation with the ARC, will recommend for FERC approval a permanent flow level within the range specified in the flow component. Upon approval, the District will implement that permanent flow level.

## **1.4. Coordination and Integration**

### **1.4.1. District's Role**

The District has the responsibility to implement the PF Plan as required by a new license issued by FERC and accepted by the District. The District will be responsible for:

- funding to carry out the measures as described herein;
- coordinating with surrounding landowners regarding land management in or near the Project boundary that may affect or be affected by the measures provided;
- consulting with appropriate stakeholders, the ARC and the FERC as needed;
- monitoring resource effects; and
- reporting to FERC.

### **1.4.2. ARC Involvement**

The District will meet with the ARC on a quarterly basis to discuss relevant topics regarding the implementation of this Plan as described in the various sections below. On an annual basis, the District will discuss with the other ARC members that year's potential process flow events.

Several ARC members have expressed an interest in receiving advance notice when a process flow will be released so they may observe and monitor the release. The District will strive to notify those ARC members 48 hours prior to the release via email or phone. Notices of process flows will be posted to the District's web site; and mining claimants will be notified via email/phone. After a process flow release occurs, the District will notify the ARC within 5 business days via email or phone, regarding the timing, duration, and magnitude of the event.

### **1.4.3. Resources**

Due to the natural setting of the Project recreation facilities and the complicated interaction of natural resources, unintended effects may occur without close monitoring and consideration of resource

interactions and other PM&E measures. The District will coordinate the actions of the PF Plan with the actions of the various Project resource management plans including the:

- Marsh Creek Slide Plan – for cross reference to high flow event creation and monitoring to assess success of modifications to the Marsh Creek Slide.
- Whitewater Recreation Plan – for cross reference to timing, magnitude and duration of scheduled and unscheduled viable whitewater events.
- Adaptive Management Plan – for cross reference to the process for modifying this Plan within the constraint of the license article based on monitoring results.
- Fisheries and Habitat Monitoring Plan - for cross reference to monitoring components (such as habitat surveys, redd surveys and smolt traps).
- Rule curves and downramping requirements.

The District’s resource specialists will be consulted as needed. Operational staff will be trained on the unique requirements of the PF Plan.

## **2. PROCESS FLOW DETAILS**

The District will discharge water from the Project into the Sultan River to ensure that the magnitude, duration, timing and frequency of the process flow components specified are achieved<sup>1</sup>. The magnitude, duration, timing and frequency of the process flow components may be achieved through any combination of controlled (including whitewater boating releases pursuant to A-LA 4) and uncontrolled flow releases (i.e. spill) and accretion. Figure 1 identifies the locations of United States Geological Survey (USGS) and District stream gages that will be used for measuring compliance.

The process flow regime has the following components:

### **2.1.Channel Forming Flow**

One (1) time every ten (10) years, for the term of the License, the District will discharge water from the Project if necessary to ensure that a channel-forming flow is achieved. A channel-forming flow is achieved when (a) a target flow of at least 6,500 cfs instantaneous flow is maintained for twenty-four (24) consecutive hours at USGS Gaging Station No. 12138160 (below the Powerhouse) or (b) a target flow of 6,500 cfs is achieved but not sustained for a 24 hour duration and the Licensee demonstrates a good faith effort by providing a maximum release flow from the Powerhouse, the outlet pipe located adjacent to the City of Everett’s Diversion Dam, and Culmback Dam (via the Howell Bunger and 42-inch slide valves) for twenty-four (24) consecutive hours at the time when flow drops below 6,500 cfs for a total duration (including the target flow and maximum release) of twenty-four (24) consecutive hours as measured at USGS Gaging Station No. 12138160, or (c) the Licensee provides a maximum release flow from the Powerhouse, the outlet pipe located adjacent to the City of Everett’s Diversion Dam, and Culmback Dam (via the Howell Bunger and 42-inch slide valves) for twenty-four (24) consecutive hours that is timed to achieve, to the extent feasible, a target flow of 6,500 cfs at USGS Gaging Station No. 12138160. This channel-forming flow obligation shall be in addition to the required channel maintenance flow obligation.

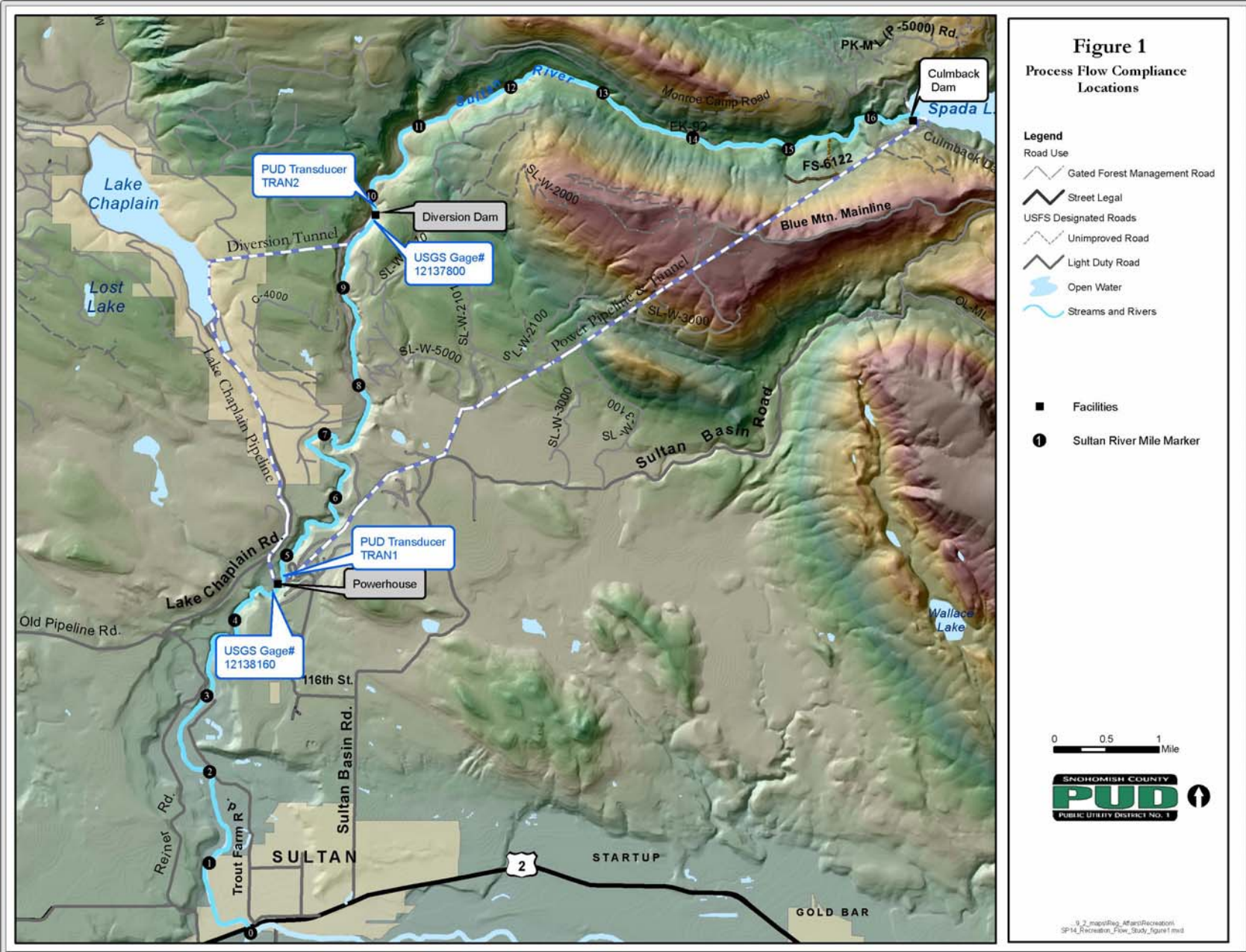
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<sup>1</sup> To account for monitoring and release equipment imprecision and accretion flow variability, process flow compliance shall have been achieved when the average component flow is achieved notwithstanding temporary fluctuations of up to ten (10) percent of the required flow levels for so long as the average over the process flow duration is greater than or equal to the specified process flow target level.

## **2.2. Channel Maintenance Flow**

Four (4) times per every ten (10) years (but not less than once every four (4) years), for the term of the License, the District will discharge water from the Project if necessary to ensure that a channel maintenance flow is achieved. A channel maintenance flow is achieved when (a) a target flow of at least 4,100 cfs instantaneous minimum flow is maintained for twenty-four (24) consecutive hours at USGS Gaging Station No. 12138160 (below the Powerhouse) or (b) a target flow of at least 4,100 cfs is achieved but not sustained for a 24-hour duration and the Licensee demonstrates a good faith effort by providing a maximum release flow from the Powerhouse, the outlet pipe located adjacent to the City of Everett's Diversion Dam, and Culmback Dam (via the Howell Bunger and 42-inch slide valves) at the time when flow drops below 4,100 cfs for a total duration (including the target flow and maximum release) of twenty-four (24) consecutive hours as measured at USGS Gaging Station No. 12138160. (See footnote 1 above.)





## **2.3. Flushing Flows**

### **2.3.1. Reach 1 (River Mile (RM) 0.0 to RM 4.5)**

Two (2) times every year, for the term of the License, the District will discharge water from the Powerhouse if necessary to ensure that spring and fall flushing flows are achieved. One (1) of the annual flushing flows shall occur between April 1 and May 31 and one (1) of the annual flushing flows shall occur in September. A flushing flow in this reach is achieved when a minimum of 1,500 cfs is maintained for six (6) consecutive hours at USGS Streamflow Gage No. 12138160. In the event that the elevation of Spada Reservoir is below 1420 feet at the time of a scheduled flushing flow, a flushing flow will be achieved when a minimum of 1,200 cfs is maintained for six (6) consecutive hours at USGS Streamflow Gage No. 12138160. (See footnote 1.)

### **2.3.2. Reach 2 (RM 4.5 to RM 9.7)**

The District will discharge water from the outlet pipe located adjacent to the City of Everett's Diversion Dam if necessary to ensure that two (2) flushing flows are achieved annually. One (1) of the annual flushing flows shall occur between April 1 and May 31 and one (1) of the annual flushing flows shall occur in September. A flushing flow is achieved in this reach when either (a) a minimum of 500 cfs is maintained for six (6) consecutive hours immediately upstream of the Powerhouse at RM 4.7 or (b) a minimum of 700 cfs is maintained for three (3) consecutive hours immediately upstream of the Powerhouse at RM 4.7. (See footnote 1 above.)

### **2.3.3. Reach 3 (RM 9.7 to RM 16.1)**

The District will discharge water from Culmback Dam if necessary to ensure that two (2) flushing flows are achieved per year. One (1) of the annual flushing flows shall occur between April 1 and May 31 and one (1) of the annual flushing flows shall occur in September. A flushing flow is achieved in this reach when either a minimum of 400 cfs is maintained for six (6) consecutive hours immediately upstream of the City of Everett's Diversion Dam at RM 9.8 or b) a minimum of 600 cfs is maintained for three (3) consecutive hours immediately upstream of the City of Everett's Diversion Dam at RM 9.8. (See footnote 1 above.)

## **2.4. Upstream Migration Flow**

### **2.4.1. Reach 1**

The District will discharge water from the Powerhouse if necessary to ensure that one (1) upstream migration flow per year is achieved in Reach 1. The upstream migration flow shall occur in September. An upstream migration flow is achieved when a flow between 800 and 1,200 cfs, as determined by the ARC, is maintained or exceeded for six (6) consecutive hours at USGS Gaging Station No. 12138160. (See footnote 1 above.)

### **2.4.2. Reach 2**

The District will discharge water from the Project if necessary to ensure that one (1) upstream migration flow per year is achieved in Reach 2. The upstream migration flow shall occur in September. An upstream migration flow is achieved when a flow between 400 and 600 cfs, as determined by the ARC, is maintained or exceeded for six (6) consecutive hours immediately upstream of the Powerhouse at RM 4.7. (See footnote 1 above.)

### **2.4.3. Reach 3**

Upon the date that the Licensee completes the Diversion Dam's volitional fish passage modifications, the District will discharge water from Culmback Dam if necessary to ensure that one (1) upstream

migration flow per year is achieved in Reach 3. The upstream migration flow shall occur in September. An upstream migration flow is achieved when a flow between 300 and 500 cfs, as determined by the ARC, is maintained or exceeded for six (6) consecutive hours immediately upstream of the City of Everett's Diversion Dam at RM 9.8. (See footnote 1 above.)

## **2.5. Outmigration Flow**

### **2.5.1. Reach 1**

The District will discharge water from the Powerhouse if necessary to ensure that two (2) outmigration flows per year are achieved. One (1) of the annual outmigration flows shall occur in April and one (1) of the annual migration flows shall occur in May, with a minimum of seven days separation between events. An outmigration flow is achieved when a flow between 800 and 1,200 cfs, as determined by the ARC, is maintained or exceeded for six (6) consecutive hours at USGS Gaging Station No. 12138160. The PF Plan shall address the proportion of the outmigration flow that must occur during night time hours to best protect juvenile salmonids from predation. (See footnote 1 above.)

### **2.5.2. Reach 2**

The District will discharge water from the project if necessary to ensure that two (2) outmigration flows per year are achieved in Reach 2. One (1) of the annual outmigration flows shall occur in April and one (1) of the annual migration flows shall occur in May, with a minimum of seven days separation between events. An outmigration flow is achieved when a flow between 400 and 600 cfs, as determined by the ARC, is maintained or exceeded for six (6) consecutive hours immediately upstream of the Powerhouse at RM 4.7. The PF Plan shall address the proportion of the outmigration flow that must occur during night time hours to best protect juvenile salmonids from predation. (See footnote 1 above.)

### **2.5.3. Reach 3**

After the date that the District completes the Diversion Dam's volitional fish passage modifications and the ARC determines that an outmigration flow in Reach 3 is needed for timely and effective anadromous fish outmigration, the District will discharge water from Culmback Dam if necessary to ensure that two (2) outmigration flows per year are achieved. One (1) of the annual outmigration flows shall occur in April and one (1) of the annual migration flows shall occur in May, with a minimum of seven days separation between events. An outmigration flow is achieved when a flow between 200 and 400 cfs, as determined by the ARC, is maintained or exceeded for six (6) consecutive hours immediately upstream of the City of Everett's Diversion Dam at RM 9.8. The PF Plan shall address the proportion of the outmigration flow that must occur during nighttime hours to best protect juvenile salmonids from predation. (See footnote 1 above.)

## **3. SCHEDULING FLOWS**

### **3.1. Timing/Sequencing**

The District can achieve these process flow components through any combination of controlled (including whitewater boating releases and coordination with other process flows) and uncontrolled flow releases (i.e. spill), and accretion. Whenever possible, the District will attempt to coordinate releases to achieve multiple resource objectives while conserving water resources. The controlled flow releases shall be consistent with the Licensee's obligation pursuant to other License Articles and agreements with the City of Everett pertaining to its municipal water supply needs. The District, in consultation with the ARC, will schedule the timing of the controlled flow releases for any process flow component to avoid the exacerbation of any downstream flooding, and take into account Project

maintenance needs and aquatic resource (including fish and macroinvertebrates) management concerns.

As indicated in the Whitewater Recreation Plan, the District intends to maximize the use of the water resource by sequencing any annual releases in Reach 2 and 3 for whitewater flow with releases for other objectives such as upmigration, outmigration, and channel flushing identified in this Plan. To the extent possible, this sequencing will occur by scheduling these recreational events during the spring (April/May) and early fall (September). Once scheduled, the dates for these multiple objective releases will be presented to the ARC. Additionally, whitewater opportunities may be possible on the ascending or descending limbs of the channel maintenance or forming flows when they occur.

The District monitors meteorological forecast service reports which tend to be reliable looking forward for up to 10 days. This information coupled with local stream and rainfall gages will allow the District to opportunistically plan certain process flow events when it anticipates a viable event is likely based on the prediction of significant accretion. If the actual accretion flow is insufficient to meet the criteria of a process flow event, the District may release water from Culmback Dam in order to meet the requirements.

The District has a good understanding of the interaction between the rainfall and streamflow in the Sultan basin and downstream influence on the water levels near the confluence of the Sultan and Skykomish rivers. The District will monitor stage and discharge at the Skykomish River near the Gold Bar Gaging Station (USGS No. 12134500) to ensure that process flow releases in the Sultan River do not exacerbate flooding in the City of Sultan.

### **3.2. Restrictions**

When evaluating potential constraints, there are three fundamental considerations related to process flow releases; volume of discharge, duration, and season. Constraints should be evaluated relative to a single event.

In general, the volume of water associated with a single short duration release for upstream migration, outmigration or channel flushing will have negligible impact on water supply. The volume for a single event is between 200 and 300 acre feet depending on release magnitude and duration. Seasonally, the only release of any potential concern to water supply would be the September release and only under drought conditions. In addition to fishery benefits, the September release is intended to be a multi-purpose release to also provide a viable whitewater recreation event. Despite these considerations, the drought provision within the proposed license article A-LA-8 is intended to address sensitivities associated with releases during drought conditions. Interim modifications during drought conditions include flow reductions or postponement of releases (see section 3.3. below). As identified in the license article, the District will develop a drought controlled flow schedule if necessary during the course of a water year.

Similarly, the volume of water associated with a single short duration release for process flow purposes will have an impact on generation. The foregone generation associated with a single event is between 200 and 300 megawatt hours depending on release magnitude and duration. Depending on variable market conditions, the financial implications tied to a process flow release can be significant and should be considered during scheduling. When possible, releases will be scheduled to coincide with large accretion flow events.

Potential impacts to aquatic resources need consideration when scheduling process flow releases. While short in duration, the impacts from a relative increase in discharge coupled with a disruption to the thermal regime must be considered. As a general rule, releases should be avoided during the summer months and scheduled to occur between September 1 and May 31. The District will seek input from the ARC if the District decides to release a process flow event sometime during June 1 to August 31.

Potential impacts to flooding in the City of Sultan also must be taken into account. The District will strive to avoid releases when the potential for flooding in the City of Sultan is apparent and a release by the District would exacerbate flooding that is already occurring.

### **3.3. Drought Years**

During the course of a water year, if necessary, the District, in consultation with the ARC, will develop a drought controlled flow release schedule for process flow components when: (1) a drought event resulting in voluntary reductions in domestic water consumption (as described by the 2007 City of Everett's Drought Response Plan as a Stage 2 response to a drought event ) is occurring; (2) the process flow components described in this LA require interim modification (including changes in timing or reductions in flow magnitude) to manage water supply during periods of weather-related shortages; and (3) the drought release schedule shall not undermine the purposes of this PM&E. The District will notify the Commission and will implement the drought release schedule within seven (7) days of providing such notice, unless otherwise directed by the Commission.

The District intends that that any drought release schedule for modification of process flow components prepared by the District will be proportionate to the severity of the drought. For example, the District, in consultation with the ARC, will have flexibility to respond to drought events, depending upon the drought's severity, by delaying, reducing, or changing the timing of process flow components. The District intends that the drought release schedule will take into account the efficacy of voluntary reductions in domestic water consumption, and will consider contingencies if the consumption reductions do not materialize.

## **4. MONITORING**

### **4.1. Channel Forming and Channel Maintenance**

Within one year of license issuance, the District will establish permanent reference transects (see Figure 2) within each operational reach of sufficient width to include riparian and side channel habitats with horizontal and vertical control, generally as follows:

- Reach 3 – RM 14.3 and RM 9.8
- Reach 2 – RM 9.5 and RM 4.9
- Reach 1 – RM 4.5, RM 2.5, RM 1.5, RM 0.5

The District will collect physical habitat measurements following channel forming and channel maintenance events. The measurements to be collected under summer low flow conditions (target 300 to 400 cfs) at each of the seven reference transects will include the following:

- Water surface elevation;
- Cross sectional profiles, 20 standardized measurements of depth / bed elevation across transect at evenly spaced, fixed cell locations;

- Underwater (and above water, if gravel bar is exposed under summer low flow conditions) photo reference shots with scale at a minimum of 5 uniformly spaced, fixed cell locations per transect with standardized point of view upstream oriented at top of photo);
- One pebble count (Wolman 1954) per transect; and
- Photo documentation of riparian conditions at fixed cell locations with standardized point of view as noted in field notes (e.g. looking upstream or downstream).

For channel forming flows exclusively, the District will conduct additional enhanced visual documentation, including aerial photography, of lower mainstem and side channel areas during summer low flow conditions (300 to 400 cfs) after the occurrence of a channel forming flow:

- Aerial photography will duplicate previous efforts for comparability (photo scale will be approximately 1" to 500' with 60% forward overlap); and
- Low level aerial photography may also be used.

## **4.2. Flushing Flows**

The channel flushing flow program is intended to annually provide two releases of a specific magnitude and duration with one occurring in advance of the spring and one occurring in advance of the fall spawning seasons. These releases will flush the streambed of fines and organic matter. An increase in turbidity to greater than 20 NTU<sup>2</sup>, as measured with existing instrumentation at the Diversion Dam, will be considered indicative of effective flushing. In year 10, a review of the hydrologic record and turbidity data will be prepared and presented in a Process Flow Effectiveness Report. If the review indicates, that the intent of the channel flushing program is being achieved by natural events then the ARC will give consideration to suspending or modifying the program.

## **4.3. Upmigration**

As described in Section 2.4 above, upmigration flows may be provided as necessary. As described in the Fishery and Habitat Monitoring Plan, annual fall spawning surveys will be conducted throughout the term of the license to provide data for determining the need for and effectiveness of upmigration flows. Fall surveys of salmon escapement will be initiated in late August / early September prior to the scheduled release for upmigration. Per existing protocols, surveys will be conducted at ten day intervals through the spawning season, as conditions allow. The benefit provided by the release will be assessed by looking at the temporal distribution of fish and the presence of redds through the spawning season. This distribution with the release program in place will be compared with the historic distribution without an upmigration release program. In year 10 of the license, these data will be presented to the ARC in a Process Flow Effectiveness Report.

## **4.4. Outmigration**

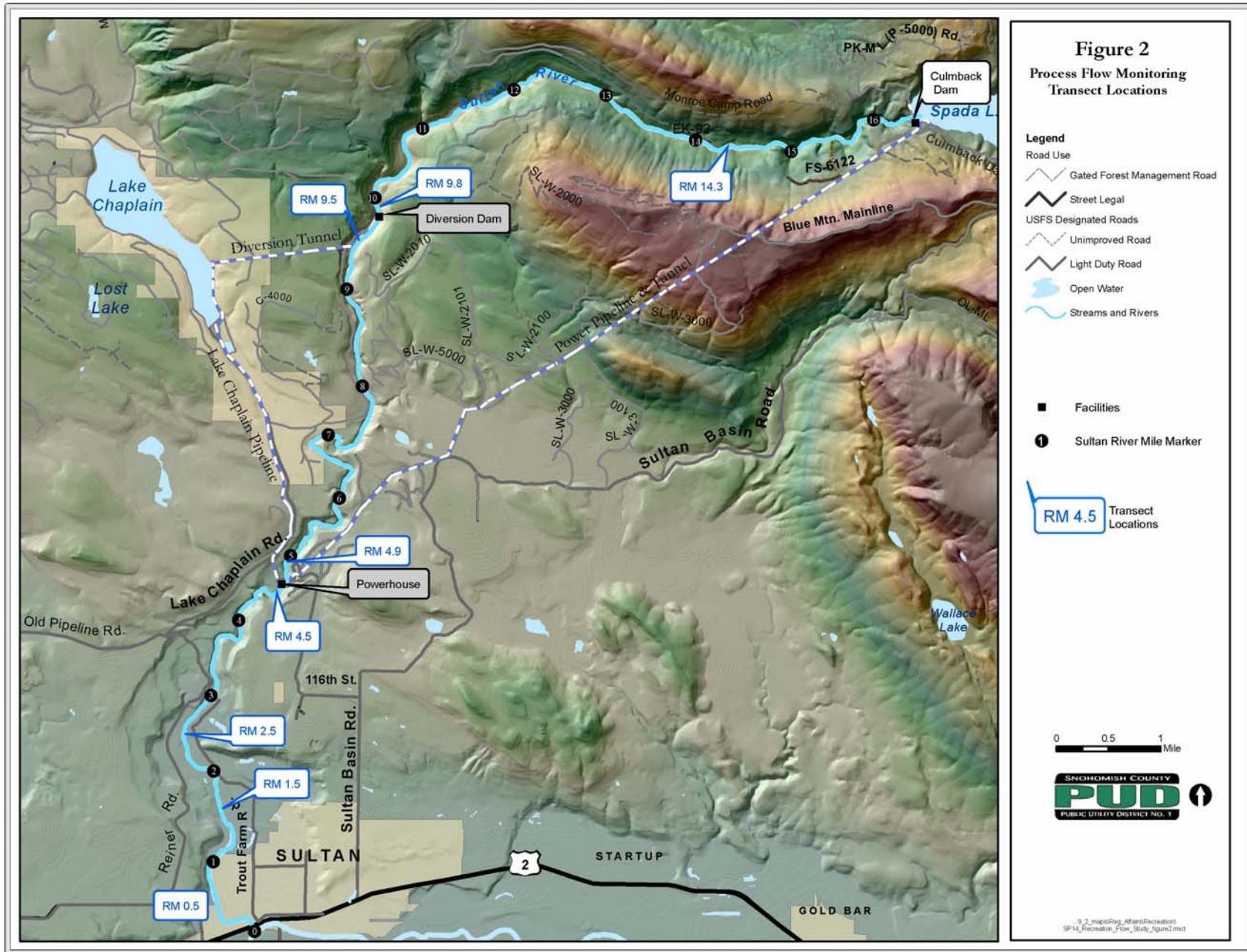
As described in Section 2.5 above, pulse flow releases, intended to stimulate outmigration, will occur twice annually during the months of April and May with one occurring during the day and one at night. As described in the Fishery and Habitat Monitoring Plan, a juvenile trap will be operated in the lower Sultan River to assess natural salmonid production. During the first six years after license issuance, a screw trap will be operated on an annual basis between the months February and June. The trap will be

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<sup>2</sup> This value was derived from the relationship between discharge in the bypass reach and turbidity at the Diversion Dam as presented in Section 5.3.3 of the Water Quality Final Technical Report. The spike in turbidity that comes with increased discharge (typically associated with fall rains) is considered to be indicative of flushing of surficial fine sediment and leaf litter from the substrate.

operated between 30 and 40 percent of the hours in any given week and scheduled to sample four (4) day and four (4) night periods per week. The screw trap will be operated the days before, during, and after the pulse flow release with distinct day/night sampling periods. The trap will also be operated in the hour immediately before, during, and the hour immediately after the pulse flow release, when possible. Trap catch will be correlated with discharge throughout the outmigration period. In year 10 of the license, these data will be presented to the ARC in a Process Flow Effectiveness Report.







## **5. REPORTING**

### **5.1. Schedule and Contents**

An annual log will be maintained that documents the details of all process flow events. For each event, this log will include: date, time, duration, magnitude, portion of release from accretion, as well as notes on timing/sequencing with recreation events, Project maintenance activities and aquatic resource response (see Appendix 3).

Every ten years, the District will develop a Process Flow Effectiveness Report. This report will analyze the results of the monitoring components of the Fisheries and Habitat Monitoring Plan in conjunction with the release data. This information will be reviewed in light of the objectives defined in Section 1.3 above.

### **5.2. Plan Review and Updates**

In conjunction with the Process Flow Effectiveness Report, the District will review the details of this PF Plan. Based upon this review, the District may make recommendations to the ARC for alteration or refinement of the process flow components. If the ARC concurs with the proposed alteration or refinement of the process flow components is appropriate, the District will petition the FERC for an alteration of the PF Plan.

## **6. REFERENCES**

City of Everett. 2007. City of Everett's Drought Response Plan.

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R2 Resource Consultants. 2008. Indicators of Hydrologic Alteration/Range of Variability Analysis (IHA/RVA) in the Sultan River Downstream of Culmback Dam. Prepared for Snohomish County PUD.

Stillwater Sciences and Meridian Environmental. 2008. Sultan River Physical Process Studies. Prepared for Snohomish County PUD.

Wolman, M.G. 1954. A method of sampling coarse river-bed material Transactions American Geophysical Union. Volume 35. Number 6. Pp. 951-956.

# Appendix 1

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*Proposed License Article 8*

## **A-LA 8: Process Flow Regime**

The Licensee shall discharge water from the Project into the Sultan River to ensure that the magnitude, duration, timing and frequency of the process flow components specified within sections 1 through 5 of this License Article are achieved. However, unless otherwise provided by this License Article, the magnitude, duration, timing and frequency of the process flow components may be achieved through any combination of controlled (including whitewater boating releases pursuant to A-LA 4) and uncontrolled flow releases (i.e. spill) and accretion flow.

The controlled flow releases shall be consistent with the Licensee's obligation pursuant to other License Articles and agreements with the City of Everett pertaining to its municipal water supply needs. The Licensee, in consultation with the Aquatic Resources Committee (ARC), shall schedule the timing of the controlled flow releases for any process flow component to avoid exacerbation of any downstream flood damage, and take into account maintenance and real-time aquatic resource (including fish and macroinvertebrates) concerns.

During the course of a water year, if necessary, the Licensee, in consultation with the ARC, shall develop a drought controlled flow release schedule for process flow components when: (1) a drought event resulting in voluntary reductions in domestic water consumption (as described by the 2007 City of Everett's Drought Response Plan as a Stage 2 response to a drought event ) is occurring; (2) the process flow components described in this LA require interim modification (including changes in timing or reductions in flow magnitude) to manage water supply during periods of weather-related shortages; and (3) the drought release schedule shall not undermine the purposes of this LA. The Licensee shall notify the Commission and shall implement the drought release schedule within seven (7) days of providing such notice, unless otherwise directed by the Commission.

With respect to the maintenance flows (section 1), the flushing (section 3), upstream migration (section 4), and outmigration (section 5) process flow components, for compliance purposes (to account for monitoring imprecision and release equipment variability and accretion flow variability), a component flow is achieved notwithstanding temporary fluctuations of up to ten (10) percent of the required flow levels for so long as the average over the process flow component duration is above the specified process flow component flow level.

Based upon A-LA 17 monitoring and the best available information, in year ten (10) of this License and every ten (10) years thereafter, the Licensee shall file a process flow effectiveness report with the Commission for its approval, after consultation with the ARC. The report will evaluate the effectiveness of each process flow component in achieving its designated objective.

**A-LA 8 Table 1. Process Flow Components Summary**

Process Flow Component	Magnitude and Duration	Frequency
<p><b>Component 1:</b> Channel Maintenance Flow (measured at USGS Streamflow Gage No. 12138160)</p>	<p>Component Flow achieved when: (a) a target flow of at least 4100 cfs is maintained for twenty-four (24) hours; or  (b) a target flow of at least 4100 cfs is achieved and the Licensee provides a maximum release flow at the time when flow drops below 4100 cfs for a total duration (including the target flow and maximum release) of twenty-four (24) consecutive hours.</p>	<p>Four (4) times every ten (10) years (but not less than once every four (4) years).</p>
<p><b>Component 2:</b> Channel Forming (measured at USGS Streamflow Gage No. 12138160)</p>	<p>Component flow is achieved when: (a) a target flow of at least 6500 cfs is maintained for twenty-four (24) consecutive hours; or  (b) a target flow of 6500 cfs is achieved and the Licensee provides a maximum release flow at the time when flow drops below 6500 cfs for a total duration (including the target flow and maximum release) of twenty-four (24) consecutive hours, or  (c) the Licensee provides a maximum release flow for twenty-four (24) consecutive hours that is timed to achieve, to the extent feasible, a target flow of 6500 cfs.</p>	<p>One (1) time every ten (10) years.</p>
<p><b>Component 3.1:</b> Reach 1 Flushing Flows (measured at USGS Streamflow Gage No. 12138160)</p>	<p>Component flow is achieved when 1500 cfs is maintained for six (6) consecutive hours. If the Spada Reservoir is below 1420 feet, component flow is achieved when a 1200 cfs instantaneous minimum flow is maintained for six (6) consecutive hours.</p>	<p>Two (2) times every year (with one occurring in September and one occurring between April 1 and May 31).</p>

<p><b>Component 3.2:</b> Reach 2 Flushing Flows(measured immediately upstream of Powerhouse at RM 4.7)</p>	<p>Component flow achieved when: (a) a 500 cfs instantaneous minimum flow is maintained for six (6) consecutive hours; or  (b) a 700 cfs instantaneous minimum flow is maintained for three (3) consecutive hours.</p>	<p>Two (2) times every year (with one occurring in September and one occurring between April 1 and May 31).</p>
<p><b>Component 3.3:</b> Reach 3 Flushing Flows (measured immediately upstream of City's Diversion Dam at RM 9.8)</p>	<p>Component flow achieved when: (a) a 400 cfs instantaneous minimum flow is maintained for six (6) consecutive hours; or  (b) a 600 cfs instantaneous minimum flow is maintained for three (3) consecutive hours.</p>	<p>Two (2) times every year (with one occurring in September and one occurring between April 1 and May 31).</p>
<p><b>Component 4.1:</b> Reach 1 Upstream Migration Flow (measured at USGS Streamflow Gage No. 12138160)</p>	<p>Component flow achieved when a minimum flow between 800 and 1200 cfs as determined by the Aquatic Resource Committee (ARC) is maintained or exceeded for six (6) consecutive hours.</p>	<p>One (1) time per year (occurring in September).</p>
<p><b>Component 4.2:</b> Reach 2 Upstream Migration Flow (measured immediately upstream of the Powerhouse at RM 4.7)</p>	<p>Component flow is achieved when a flow between 400 and 600 cfs instantaneous minimum flow, as determined by the ARC, is maintained for six (6) consecutive hours.</p>	<p>One (1) time per year (occurring in September).</p>
<p><b>Component 4.3:</b> Reach 3 Upstream Migration Flow (measured immediately upstream of the City's Diversion Dam at RM 9.8)</p>	<p>Component flow achieved when a minimum flow between 300 and 500 cfs as determined by the ARC is maintained or exceeded for six (6) consecutive hours.</p>	<p>One (1) time per year (occurring in September) after completion of Diversion Dam volitional fish passage modification.</p>

<p><b>Component 5.1:</b> Reach 1 Outmigration Flow (measured at USGS Streamflow Gage No. 12138160)</p>	<p>Component flow is achieved when between 800 and 1200 cfs minimum flow as determined by the ARC is maintained or exceeded for six (6) consecutive hours.</p>	<p>Two (2) times per year (one occurring in April and one occurring in May).</p>
<p><b>Component 5.2:</b> Reach 2 Outmigration Flow (measured immediately upstream of the Powerhouse at RM 4.7)</p>	<p>Component flow is achieved when between 400 and 600 cfs minimum flow as determined by the ARC is maintained or exceeded for six (6) consecutive hours.</p>	<p>Two (2) times per year (one occurring in April and one occurring in May).</p>
<p><b>Component 5.3:</b> Reach 3 Outmigration Flow (measured immediately upstream of the City's Diversion Dam at RM 9.8)</p>	<p>Component flow is achieved when between 200 and 400 cfs minimum flow as determined by the ARC is maintained or exceeded for six (6) consecutive hours.</p>	<p>Two (2) times per year (one occurring in April and one occurring in May) after volitional fish passage and the ARC determines need.</p>

Within ninety (90) days of issuance of the License, the Licensee shall file with the Commission for approval, a PF Plan. This PF Plan shall document how the Licensee shall implement a program for periodic controlled flow releases from the Powerhouse, the outlet pipe located adjacent to the City of Everett's Diversion Dam, and Culmback Dam. The PF Plan shall include provisions that describe: (1) the frequency, magnitude, duration, and timing of process flow components consistent with this License Article; (2) the ongoing involvement of the ARC in implementing this program; (3) the mechanism for timing controlled flow releases (including whitewater boating releases pursuant to A-LA 4) to coincide with natural rainfall events or uncontrolled flow releases to achieve the flow frequency, magnitude, and duration for each of the process flow components; (4) the timing and other restrictions necessary to minimize impacts to aquatic resources, to not exacerbate downstream flood damage in the City of Sultan; (5) the method, locations, and schedule for monitoring and measuring process flow components; (6) the method and schedule for studying the necessity of flushing flow for supporting the geomorphic process goals; (7) the method and schedule for studying the necessity of upstream migration flow and outmigration flow for providing timely and effective upstream and downstream migration of anadromous fish; and (8) the method and schedule for monitoring the impacts of process flow upon aquatic resources.

The Licensee shall develop the PF Plan in consultation with the ARC. The Licensee shall allow a minimum of thirty (30) days for members of the ARC to comment and make recommendations before submitting the PF Plan to the Commission. When filing the PF Plan with the Commission, the Licensee shall include documentation of consultation, copies of comments and recommendations, and specific descriptions of how comments and recommendations from the ARC are accommodated by the Licensee's plan. If the Licensee does not adopt a recommendation, the filing shall include the Licensee's reasons based upon Project-specific information.

Upon Commission approval, the Licensee shall implement the PF Plan.

The process flow regime specified by this License Article has the following components:

1. Channel Maintenance Flow: Four (4) times per every ten (10) years (but not less than once every four (4) years) for the term of the License, the Licensee shall discharge water from the Project if necessary to ensure that a channel maintenance flow is achieved. A channel maintenance flow is achieved when (a) a target flow of at least 4100 cfs instantaneous minimum flow is maintained for twenty-four (24) consecutive hours at USGS Streamflow Gage No. 12138160 or (b) a target flow of at least 4100 cfs is achieved and the Licensee provides a maximum release flow from the Powerhouse, the outlet pipe located adjacent to the City of Everett's Diversion Dam, and Culmback Dam (via the Howell Bunger and 42-inch slide valves) at the time when flow drops below 4100 cfs for a total duration (including the target flow and maximum release) of twenty-four (24) consecutive hours as measured at USGS Streamflow Gage No. 12138160.
2. Channel Forming Flow: Once (1) every ten (10) years for the term of the License, the Licensee shall discharge water from the Project if necessary to ensure that a channel-forming flow is achieved. A channel-forming flow is achieved when (a) a target flow of at least 6500 cfs instantaneous minimum flow is maintained for twenty-four (24) consecutive hours at USGS Streamflow Gage No. 12138160 or (b) a target flow of 6500 cfs is achieved and the Licensee provides a maximum release flow from the Powerhouse, the outlet pipe located adjacent to the City of Everett's Diversion Dam, and Culmback Dam (via the Howell Bunger and 42-inch slide valves) for twenty-four (24) consecutive hours at the time when flow drops below 6500 cfs for a total duration (including the target flow and maximum release) of twenty-four (24) consecutive hours as measured at USGS Streamflow Gage No.

12138160, or (c) the Licensee provides a maximum release flow from the Powerhouse, the outlet pipe located adjacent to the City of Everett's Diversion Dam, and Culmback Dam (via the Howell Bunger and 42-inch slide valves) for twenty-four (24) consecutive hours that is timed to achieve, to the extent feasible, a target flow of 6500 cfs at USGS Streamflow Gage No. 12138160. This channel-forming flow obligation shall be in addition to the channel maintenance flow obligation required by section 1.

### 3. Flushing Flow

- 3.1. Reach 1 (River Mile (RM) 0.0 to RM 4.5) Flushing Flows: Two (2) times every year for the term of the License, the Licensee shall discharge water from the Powerhouse if necessary to ensure that a flushing flow is achieved. One (1) of the annual flushing flows shall occur in September and one (1) of the annual flushing flows shall occur between April 1 and May 31. A flushing flow is achieved when a 1500 cfs instantaneous minimum flow is maintained for six (6) consecutive hours at USGS Streamflow Gage No. 12138160. In the event that the Spada Reservoir is below 1420 feet at the time of a scheduled flushing flow, a flushing flow is achieved when a 1200 cfs instantaneous minimum flow is maintained for six (6) consecutive hours at USGS Streamflow Gage No. 12138160.
- 3.2. Reach 2 (RM 4.5 to RM 9.7) Flushing Flows: The Licensee shall discharge water from the outlet pipe located adjacent to the City of Everett's Diversion Dam if necessary to ensure that two (2) flushing flows are achieved. One (1) of the annual flushing flows shall occur in September and one (1) of the annual flushing flows shall occur between April 1 and May 31. A flushing flow is achieved when either (a) a 500 cfs instantaneous minimum flow is maintained for six (6) consecutive hours immediately upstream of the Powerhouse at RM 4.7 or (b) a 700 cfs instantaneous minimum flow is maintained for three (3) consecutive hours immediately upstream of the Powerhouse at RM 4.7.
- 3.3. Reach 3 (RM 9.7 to RM 16.1) Flushing Flows: The Licensee shall discharge water from Culmback Dam if necessary to ensure that two (2) flushing flows per year are achieved. One (1) of the annual flushing flows shall occur in September and one (1) of the annual flushing flows shall occur between April 1 and May 31. A flushing flow is achieved when either a 400 cfs instantaneous minimum flow is maintained for six (6) consecutive hours immediately upstream of the City of Everett's Diversion Dam at RM 9.8 or b) a 600 cfs instantaneous minimum flow is maintained for three (3) consecutive hours immediately upstream of the City of Everett's Diversion Dam at RM 9.8.

### 4. Upstream Migration Flow

- 4.1. Reach 1 Upstream Migration Flow: The Licensee shall discharge water from the Powerhouse if necessary to ensure that one (1) upstream migration flow per year is achieved in Reach 1. The upstream migration flow shall occur in September. An upstream migration flow is achieved when a minimum flow between 800 and 1200 cfs as determined by the ARC is maintained or exceeded for six (6) consecutive hours at USGS Streamflow Gage No. 12138160.
- 4.2. Reach 2 Upstream Migration Flow: The Licensee shall discharge water from the Project if necessary to ensure that one (1) upstream migration flow per year is achieved in Reach 2. The upstream migration flow shall occur in September. An upstream migration flow is achieved when a flow between 400 and 600 cfs instantaneous minimum flow, as determined by the ARC, is maintained for six (6) consecutive hours immediately upstream of the Powerhouse at RM 4.7.



4.3. Reach 3 Upstream Migration Flow: Upon the date that the Licensee completes the Diversion Dam's volitional fish passage modifications, the Licensee shall discharge water from Culmback Dam if necessary to ensure that one (1) upstream migration flow per year is achieved in Reach 3. An upstream migration flow is achieved when a flow of between 300 and 500 cfs minimum flow as determined by the ARC is maintained or exceeded for six (6) consecutive hours immediately upstream of the City of Everett's Diversion Dam at RM 9.8.

## 5. Outmigration Flow

5.1. Reach 1 Outmigration Flow: The Licensee shall discharge water from the Powerhouse if necessary to ensure that two (2) outmigration flows per year are achieved. One (1) of the annual outmigration flows shall occur in April and one (1) of the annual migration flows shall occur in May. An outmigration flow is achieved when between 800 and 1200 cfs minimum flow as determined by the ARC is maintained or exceeded for six (6) consecutive hours at USGS Streamflow Gage No. 12138160. The PF Plan shall address the proportion of the outmigration flow that must occur during nighttime hours to best protect juvenile salmonids from predation.

5.2. Reach 2 Outmigration Flow: The Licensee shall discharge water from the outlet pipe located adjacent to the City of Everett's Diversion Dam if necessary to ensure that two (2) outmigration flows per year are achieved. One (1) of the annual outmigration flows shall occur in April and one (1) of the annual migration flows shall occur in May. An outmigration flow is achieved when between 400 and 600 cfs minimum flow as determined by the ARC is maintained or exceeded for six (6) consecutive hours immediately upstream of the Powerhouse at RM 4.7. The PF Plan shall address the proportion of the outmigration flow that must occur during nighttime hours to best protect juvenile salmonids from predation.

5.3. Reach 3 Outmigration Flow: Upon Commission approval after the ARC determines that an outmigration flow in Reach 3 is needed for timely and effective anadromous fish outmigration, the Licensee shall discharge water from Culmback Dam if necessary to ensure that two (2) outmigration flows per year are achieved. One (1) of the annual outmigration flows shall occur in April and one (1) of the annual migration flows shall occur in May. An outmigration flow is achieved when between 200 and 400 cfs minimum flow as determined by the ARC is maintained or exceeded for six (6) consecutive hours immediately upstream of the City of Everett's Diversion Dam at RM 9.8. The PF Plan shall address the proportion of the outmigration flow that must occur during nighttime hours to best protect juvenile salmonids from predation.

### **Below is an excerpt from the Settlement Agreement's Joint Explanatory Statement discussing the proposed license article for the Process Flow Plan.**

The process flow regime proposed within the Process Flow Regime License Article (A-LA 8) is considerably more robust than the process flow regime presented in the License Application (see Appendix B at 17). A-LA 8 specifies that the District will discharge water from the Project to ensure that the magnitude, duration, timing and frequency of the process flow components specified within Section 1 through 5 of the Article (as summarized in A-LA 8 Table 1) are achieved. Except as provided within the Article, the District can achieve these components through any combination of controlled (including whitewater boating releases) and uncontrolled flow releases (i.e. spill), and accretion flow downstream of Culmback Dam.

The intent of A-LA 8 is the same as the Process Flow Release Plan PM&E presented in the License Application, but it does not include a water budget. A-LA 8 includes flows to periodically mobilize bedload and stream bank materials. In addition, A-LA 8 provides for timing of events to use or augment naturally-occurring accretion events, a more detailed definition of flow levels in specific reaches and frequency, and a discussion of how these special purpose flow releases will be coordinated with other License Articles. Flows provided in A-LA 8 can be released by existing Project facilities.

A-LA 8 includes provisions which will allow for interim modifications (including changes in timing or reductions in flow magnitude) to the process flow components described in the Article to manage water supply during periods of weather-related shortages. The Settlement Parties intend that that any drought release schedule for modification of process flow components prepared by the District will be proportionate to the severity of the drought. For example, the District, in consultation with the ARC, will have flexibility to respond to drought events, depending upon the drought's severity, by delaying, reducing, or changing the timing of process flow components. The Settlement Parties intend that the drought release schedule takes into account the efficacy of voluntary reductions in domestic water consumption, and consider contingencies to address lower than expected voluntary reductions in domestic water consumption. Regardless, any drought release schedule may not undermine the stated purposes of this License Article.

With respect to A-LA 8 Upstream Migration Flow Component (A-LA 8 Section 4) and Outmigration Flow Component (A-LA 8 Section 5), each of these components includes a range of flow magnitudes. For example, A-LA 8 Section 4.1 specifies that the upstream migration flow is achieved when a minimum flow between 800 and 1,200 cfs as determined by the ARC is maintained or exceeded for six (6) consecutive hours. By providing a range, the Settlement Parties intend that the District, in consultation with the ARC, will test different flow magnitudes within that range during the first ten years of the License. At the end of this initial period and based upon that testing, the Settlement Parties intend that the District, in consultation with the ARC, will recommend a permanent flow level within the range specified in the flow component for FERC approval. Upon approval, the District will implement that permanent flow level.

The channel maintenance, channel forming, and sediment flushing flows outlined in A-LA 8 will likely contribute to the formation and movement of physical habitat features in the Sultan River including riffles, pools, runs, and point bars; increase LWD and sediment transport; remove interstitial fine sediment from spawning gravels; and maintain connectivity to existing side channels. In addition to initiating significant changes to in-channel habitat, regular process flows are expected to slightly alter the channel form, and limit riparian vegetation encroachment.

Although extreme high magnitude flow events during the salmon and steelhead incubation period have been linked with reduced egg-to-fry survival, short duration flow events of lesser magnitudes (pulsed flows) in the spring may trigger juvenile salmonid outmigration and increase the survival of juvenile out-migrants. In addition to benefiting juvenile outmigrants, short duration high flow events in the late summer and fall are known to initiate the upstream migration of adult salmon, limit straying to other river basins, and facilitate swimming past natural and artificial barriers. Overall, implementing the District's proposed juvenile outmigration and adult upstream migration flow releases will result in a more normative hydrograph in the lower Sultan River compared to existing conditions. This more normative hydrograph is expected to increase the survival of juvenile salmon and steelhead outmigrants during drought years and may also facilitate upstream migration of returning adults.

# Appendix 2

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*Consultation on Draft PF Plan*

## Presler, Dawn

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**From:** Presler, Dawn  
**Sent:** Wednesday, September 15, 2010 2:17 PM  
**To:** 'Tim\_Romanski@fws.gov'; 'steven.m.fransen@noaa.gov'; Barry Gall; 'Applegate, Brock A (DFW)'; 'Maynard, Chris (ECY)'; 'Abby Hook'; 'Andy' 'Haas'; 'Jim Miller'; 'Deborah Knight'; 'okeefe@amwhitewater.org'  
**Cc:** jsklare@ci.everett.wa.us; Moore, Kim; Binkley, Keith  
**Subject:** ARC - PF Plan - ready for FERC filing  
**Attachments:** Process\_Flow\_Plan.DOC

Dear ARC Members:

At the ARC meeting today, the attendees (District, WDFW, City of Everett, Sno Co, USFS) agreed that the Process Flow Plan is ready for filing with the FERC (consensus for filing). Please let me know by September 22 COB if you believe it is not ready for filing with the FERC, and any remaining comments/edits you may have. I will update the Plan with the consultation record and file with the FERC by September 24, if I do not hear back from anyone.

Thanks!

***Dawn Presler***  
Relicensing Specialist  
Jackson Hydro Project

Snohomish County PUD No. 1  
PO Box 1107 Everett, WA 98206-1107  
Phone: 425-783-1709

## Presler, Dawn

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**From:** Presler, Dawn  
**Sent:** Friday, August 13, 2010 10:48 AM  
**To:** 'Thomas O'Keefe'; 'Jim Miller'; 'Deborah Knight'; 'Steven.M.Fransen@noaa.gov'; 'Andy' 'Haas'; 'Abby Hook'; 'Tim\_Romanski@fws.gov'; 'Barry Gall'; 'Maynard, Chris (ECY)'; 'Applegate, Brock A (DFW)'  
**Cc:** Binkley, Keith; Moore, Kim; 'Engel, John'; 'jsklare@ci.everett.wa.us'  
**Subject:** FW: ARC - draft plans for 30-day review - by Aug 16  
**Attachments:** DRAFT\_PF Plan\_July2010.DOC; DRAFT\_FHMPlan\_July2010.DOC

FYI... I will be gone all next week on vacation, so if you have any comments on the attached Plans, please be sure to route them to Keith as well so he can begin to review. Thanks!

Dawn

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**From:** Presler, Dawn  
**Sent:** Friday, July 16, 2010 12:09 PM  
**To:** 'Thomas O'Keefe'; 'Jim Miller'; 'Deborah Knight'; 'Steven.M.Fransen@noaa.gov'; 'Andy' 'Haas'; 'Abby Hook'; 'Tim\_Romanski@fws.gov'; 'Barry Gall'; 'Maynard, Chris (ECY)'; 'Applegate, Brock A (DFW)'  
**Cc:** Binkley, Keith; Moore, Kim; 'Engel, John'; 'jsklare@ci.everett.wa.us'  
**Subject:** ARC - draft plans for 30-day review - by Aug 16

Dear ARC Members:

Attached are the updated draft Process Flow Plan and the draft Fish and Habitat Monitoring Plan for your 30-day review and comment period. Please send me any comments you have on these draft plans no later than Monday August 16. Thanks!

Dawn

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**From:** Presler, Dawn  
**Sent:** Wednesday, July 14, 2010 4:10 PM  
**To:** Thomas O'Keefe; Jim Miller; Deborah Knight; Steven.M.Fransen@noaa.gov; Andy' 'Haas; Abby Hook; 'Tim\_Romanski@fws.gov'; Barry Gall; Maynard, Chris (ECY); 'Applegate, Brock A (DFW)'  
**Cc:** Binkley, Keith; Moore, Kim; Engel, John; 'jsklare@ci.everett.wa.us'  
**Subject:** ARC - 7/13/10 draft meeting summary and action items for you.

Dear ARC Members:

- 1) Attached is the draft meeting summary. Per ARC guidelines 3.2.3, please provide feedback on draft meeting summary by Wednesday July 21. Also, attached is the presentation given by Steve Ralph of Stillwater Sciences.
- 2) Also, attached are the updated Final SLRF Plan and Final WTC Plan for filing with FERC. I understand that the ARC authorized the draft plans be updated based on discussions at the meeting and filed with FERC. I plan to file the both final plans with FERC this Friday morning.
- 3) Several people mentioned at the ARC meeting that the next currently scheduled ARC meeting for September 8 may not be the best date for them to meeting. Attached is a link to a poll for potential September meeting dates. Please mark your selections by Wednesday July 21 so I can send out the new meeting date/time for the September ARC meeting. <http://www.doodle.com/ahciffmf6bxaidme>

Enjoy the sun!

***Dawn Presler***  
Relicensing Specialist  
Jackson Hydro Project

Snohomish County PUD No. 1  
PO Box 1107 Everett, WA 98206-1107  
Phone: 425-783-1709

## Presler, Dawn

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**From:** Presler, Dawn  
**Sent:** Thursday, April 29, 2010 1:40 PM  
**To:** 'Steve Fransen'; 'Tim\_Romanski@fws.gov'; 'Barry Gall'; 'Applegate, Brock A (DFW)'; 'Maynard, Chris (ECY)'; 'Abby Hook'; 'Andy.Haas@co.snohomish.wa.us'; 'Jim Miller'; 'deborah.knight@ci.sultan.wa.us'; 'Thomas O'Keefe'  
**Cc:** Binkley, Keith; Moore, Kim  
**Subject:** ARC - draft PF Plan for your review  
**Attachments:** DRAFT\_PFFPlan\_April2010.DOC

Dear ARC Members:

Attached is the draft Process Flow Plan for your review. It compiles the PF components from the proposed license article and the monitoring components discussed at the last ARC meeting. Please take the next 30 days to review and provide any edits/comments; edits/comments should be emailed to me by June 1. We will also discuss this draft PF Plan at the May 13 ARC meeting.

***Dawn Presler***  
Relicensing Specialist  
Jackson Hydro Project

Snohomish County PUD No. 1  
PO Box 1107 Everett, WA 98206-1107  
Phone: 425-783-1709

# Appendix 3

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*Process Flow Events Log*



# Process Flow Log

Date <sup>1</sup>	Time <sup>2</sup>	Magnitude <sup>3</sup> (cfs)	Duration <sup>4</sup> (hrs)	Accretion <sup>5</sup> (cfs)	Notes <sup>6</sup>	Counts as PF Type <sup>7</sup>
		R1- R2- R3-		R1- R2- R3-		

For each event, attach graph of flow at each compliance point.

<sup>1</sup> Start Date of Event (MM/DD/YYYY)

<sup>2</sup> Start Time-End Time

<sup>3</sup> Magnitude of the Event for Each Compliance Location (R1-Reach 1, R2-Reach 2, R3-Reach 3)

<sup>4</sup> Duration of Event

<sup>5</sup> Portion of Event Attributed to Accretion Flows

<sup>6</sup> Notes of Day's Event, Sequencing with Other Flow Events/Maintenance

<sup>7</sup> Channel Forming (F), Channel Maintenance (M), Flushing (F), Outmigration (O), Upmigration (U)