

**City of Tacoma,
Department of Public Utilities, Light Division
Cowlitz River Project
FERC No. 2016**

Settlement Agreement License Article 10

Gravel Augmentation Plan

1. INTRODUCTION

This plan is prepared in compliance with the requirements of Settlement Agreement License Article 10, contained in Appendix A of the Federal Energy Regulatory Commission's (the Commission) Order Approving Settlement and Issuing New License for FERC Project No. 2016, issued and effective July 18, 2003. The license article requires the City of Tacoma, Department of Public Utilities, Light Division (Tacoma Power) to develop and file a plan for augmenting spawning gravel below the Barrier Dam within nine (9) months of license issuance.

1.1. PROJECT DESCRIPTION

The Cowlitz Project (FERC No. 2016) is Tacoma Power's largest electricity generating facility and is located on the Cowlitz River, Lewis County, Washington. The Project consists of two dams, the Mayfield Dam at river mile (RM) 52 and Mossyrock Dam, upstream at RM 65. In addition to the project generating electricity and providing flood control, Tacoma operates 3 major parks, manages approximately 14,000 acres of wildlife lands, and owns and funds operation of the Cowlitz Salmon Hatchery (RM 50) and the Cowlitz Trout Hatchery (RM 42). The Barrier Dam, associated with the Cowlitz Salmon Hatchery is located at RM 49.5. The original 50-year license for the Cowlitz Project was issued on December 28, 1951. A new thirty-five year license was issued and became effective on July 18, 2003.

The Mayfield development completed in 1963 includes a 250-foot-high, 850-foot-long, concrete arch and gravity dam that impounds Mayfield Lake, which has a maximum surface area of 2,250 acres. In addition to the Cowlitz River, inflows from the Tilton River also contribute to Mayfield Lake, which supports public and private recreational facilities. An 854-foot-long power tunnel passes through the right abutment of the dam and terminates at a concrete forebay structure. Four penstocks continue from the forebay structure to the four generating units, which have an installed capacity of 162-megawatts (MW).

The Mossyrock development completed in 1968 includes a 606-foot-high double curvature concrete arch dam that creates Riffe Lake, a 23-mile long, 11,830-acre reservoir with 52 miles of shoreline. Riffe Lake supports several parks and other recreational facilities. Three penstocks, varying in length from 248 to 285 feet, extend down to the powerhouse, which is adjacent to the base of the dam. The powerhouse contains two generating units with room for a third, and has a total installed capacity of 300 MW. Transmission lines link the Mossyrock and Mayfield developments.

1.2. FERC LICENSE

APPENDIX A

SETTLEMENT AGREEMENT LICENSE ARTICLES

Article 10. Gravel Augmentation.

Within 9 months of license issuance, the Licensee shall file for Commission approval a plan to augment spawning gravel below the Barrier Dam to enhance salmonid spawning habitat. The source of gravel, to the extent reasonably available, shall be just upstream of Barrier Dam. The gravel augmentation plan shall include: a) a description of plans to monitor and evaluate the effectiveness of gravel augmentation, including parameters that will be measured to determine the value of gravel placements to salmonid fish reproduction and the stability and life expectancy of such placements, and b) a plan for the discontinuation of gravel augmentation if Barrier Dam is breached, including plans to monitor the post-breach adequacy of gravel supplies and mitigate for any identified gravel shortfalls in the affected reach (Mayfield Dam to the Toutle River). The Licensee shall prepare the plan in collaboration with the Fisheries Technical Committee provided for in the August 2000 Settlement Agreement, or if the Settlement Agreement has become void, with the U.S. Fish and Wildlife Service, National Marine Fisheries Service, Washington Department of Fish and Wildlife and Washington Department of Ecology (referred to as "the FTC or agencies"). When a draft plan has been prepared, it shall be provided to all affected agencies and Tribes for 30-day review and comment. The Licensee shall include with the final plan documentation of consultation and copies of comments and recommendations, and specific descriptions of how the final plan accommodates all comments and recommendations. If the Licensee does not adopt a recommendation, the filing shall include the Licensee's reasons, based on Project-specific information. The Commission reserves the right to require changes to the plan. Upon Commission approval, the Licensee shall implement the plan, including any changes required by the Commission. Following Commission approval, the plan becomes a requirement of the license, enforceable by the Commission.

2. OBJECTIVES

Prior to the construction of Tacoma Power's hydroelectric and operational dams on the Cowlitz River, sediment was supplied to the Cowlitz River from the watershed upstream of the dams. The construction of the dams modified the natural downstream migration of the sediments in the Cowlitz River which included cobble and gravels suitable for salmon spawning. Studies during Project relicensing (Harza 1999b) demonstrated that the quantity and distribution of suitable substrate does not appear to be a limiting factor for spawning salmon in the Cowlitz River between the Barrier Dam and the Toutle River, however, there is evidence of channel bed armoring between the Barrier Dam and River Mile 40.

3. PLAN

The first requirement of the plan is to assess current bed armoring conditions from the Barrier Dam to River Mile 40 and establish the reach will benefit from and should be targeted for gravel

augmentation. A baseline survey and report to update the findings from the relicensing study (Harza 1999b) will be prepared. From that study, identification of the target reach and monitoring locations will be made. A monitoring plan will then be used to determine the success of the gravel augmentation efforts to reduce bed armoring in this reach of the Cowlitz River that supports a large salmon spawning population. These studies will be done in conjunction with the Fish Monitoring Plan (Cowlitz License Article 15) to assess salmon spawning and the effects of the instream flow requirements.

In accordance with the stated objectives of the article, Tacoma proposes to use native cobble and gravels from immediately upstream of the Barrier Dam to reduce bed armoring in the reach below the Barrier Dam. A large gravel bar currently exists from about the intake to the hatchery to about 500 feet downstream. This gravel bar along with gravels migrating downstream each year from sources below Mayfield Dam, are likely to provide an adequate and long-term source for augmentation below the Barrier Dam. Tacoma plans to create an access road over the river dike allowing access along the river from the hatchery water intake downstream approximately 250 feet. This will allow dredging of the bar by conventional crane and bucket or extend-a-hoe to approximately 40 feet from the shoreline. Dredging five feet deep would yield 1,850 cubic yards. Tacoma proposes to begin the program with an annual amount of 500 cubic yards and so this location alone may supply rock for four years or longer depending on the amount of material naturally migrating in each year. Further access improvements could be made to allow dredging of the gravel bar downstream.

This proposal is similar to two current Tacoma programs. At the Wynoochee Dam Hydroelectric Project and fish collection facility, each year the dredgings upstream of a similar barrier dam are transported and placed along the river downstream. High winter flows then recruit and transport the rock downstream. Tacoma Water has also recently begun a gravel augmentation program on the Green River below its water diversion dam. In that program, gravel is placed into the river in "piers" that extend out into the flow and then are slowly eroded at higher flows. The proposal for the Cowlitz is similar to aspects of each in that we are using native materials dredged above the barrier dam and in proposing to place the material in a pier extending out into the flow.

As required under item b) of this article, Tacoma proposes that if the Barrier Dam is planned to be breached, Tacoma will submit a study plan in advance of the breaching to monitor the post-breach adequacy of gravel supplies and mitigate for any identified gravel shortfalls in the affected reach (Mayfield Dam to the Toutle River).

4. MONITORING, EVALUATION AND REPORTING

Substrate samples will be collected at gravel sampling sites 2 through 12 on the Cowlitz River (Harza 1999b) during the base line study and then at two year intervals within the target reach for a period of ten years. Substrate samples will consist of a surface layer mean grain size and sub-surface layer mean grain size. The degree of bed armoring will be calculated as the difference in mean grain size between the layers. The surface layer will be Wolman pebble counts (Wolman 1954) and the sub-surface layer will be dry sieved. The baseline report will include conclusions regarding the target reach. Follow-up reports will be made at years 5 and 10 will include conclusions on the effectiveness of whether the initial program of 500 cubic yards per year (as proposed herein) has created the desired benefits or if the program should be discontinued or expanded. All reports shall include consultation with the agencies as listed in this license article prior to submittal to the FERC.

5. SCHEDULE

The baseline survey, report and first year gravel placement will all occur in August of year one following the FERC's approval of the plan, and upon acquiring all necessary permits. An interim report to the Commission will be filed by December 31 of year five (second follow-up survey) of the program and a final report with conclusions will be filed to the Commission in year 10. Tacoma assumes that gravel augmentation at some quantity will thereafter become a standard operating requirement of the license.

The plan was mailed to the Fisheries Technical Committee and Tribe on January 21, 2004. A display discussing the proposed plan was available to the public at a Cowlitz License Implementation Open House on February 5, 2004. No comments were received on the plan.

The only change to this plan from that mailed for consultation is the addition of a new study plan should the Barrier Dam be breached. Discussion of this is required by the license, but was not in the draft plan.

REFERENCES:

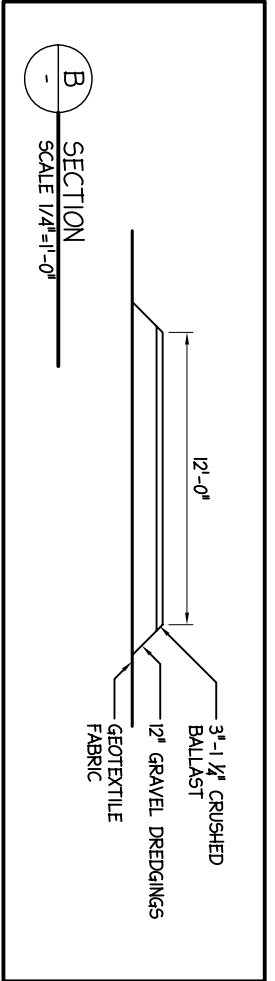
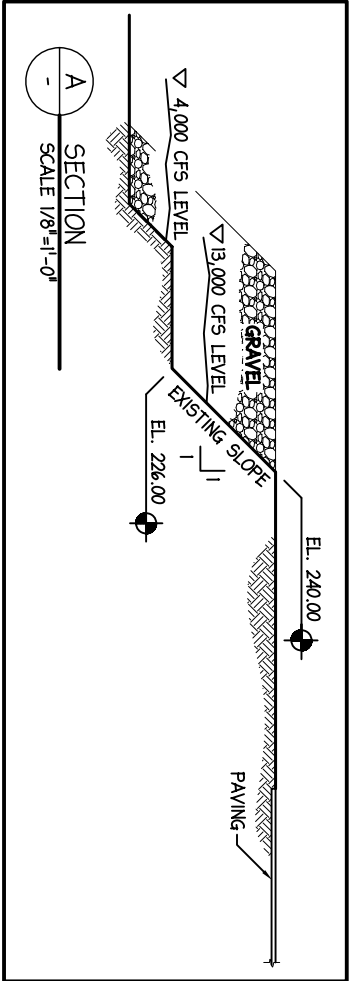
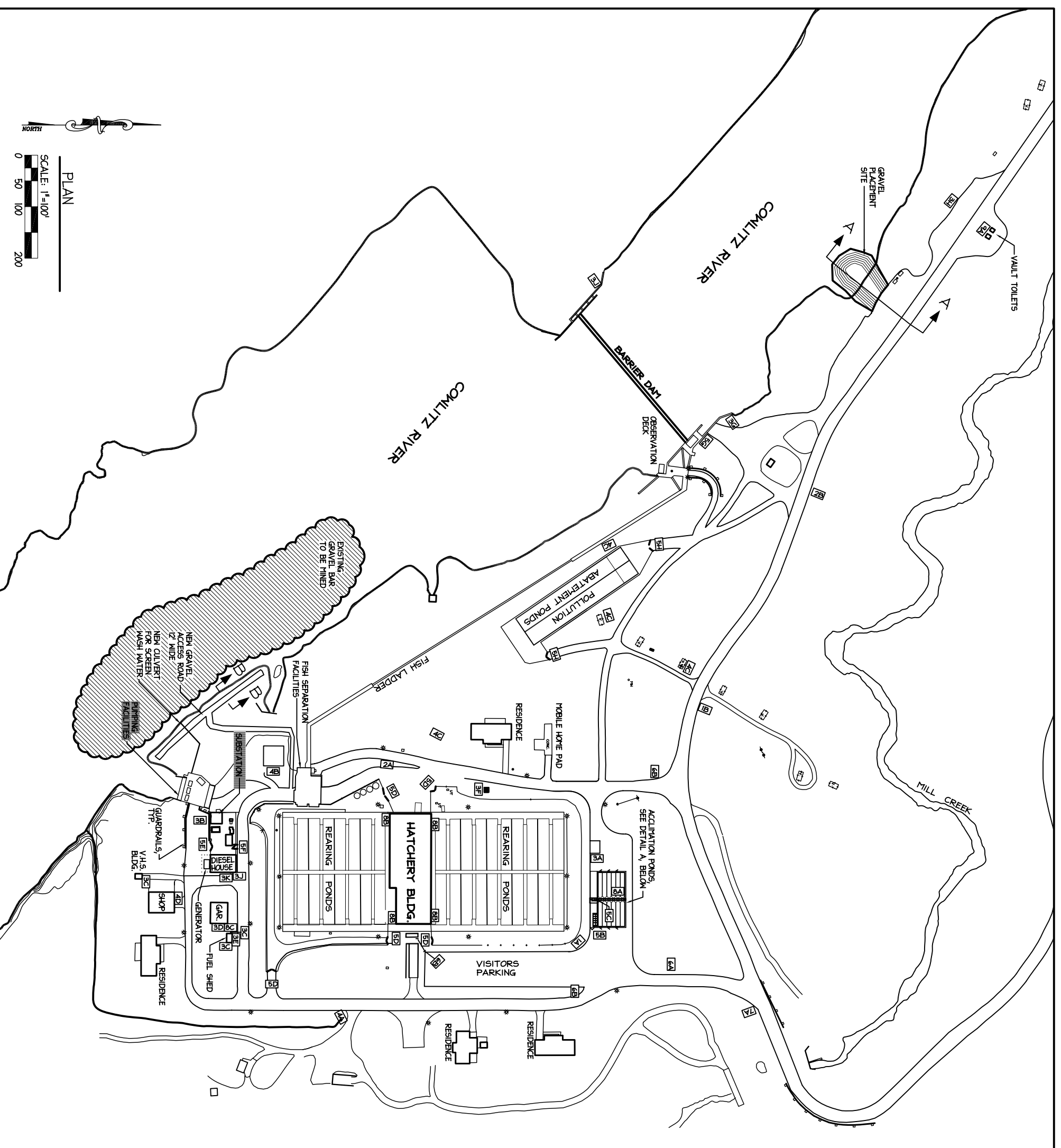
Harza. 1999b. *Cowlitz River Hydroelectric Project, FERC No. 2016. 1997 and 1998 Technical Study Reports, Volume 1: The 1997 Studies and Volume 2: The 1998 Studies.* Prepared for Tacoma Power. January 1999.

Wolman, M.G. 1954. *A Method for Sampling Coarse River-Bed Material.* *Trans. American Geophysical Union.* 35: 951-956.

APPENDICES:

1. DRAWINGS

Cowlitz Salmon Hatchery
Gravel Augmentation Plan
Borrow and Placement Sites
Dwg. No. MP4361



- NOTES:**
- 1) ROAD
 - A) REMOVE VEGETATION AND TOP SOIL FROM NEW GRAVEL ACCESS ROAD
 - B) INSTALL GEOTEXTILE FABRIC AND 12" GRAVEL DREDGING
 - C) TOP WITH CRUSHED BALLAST AND COMPACT
 - 2) DREDGING
 - A) USE CLAY BUCKET OR EXTEND-A-HOE
 - B) MACHINERY NOT TO ENTER WATER
 - C) OIL SPILL CONTAINMENT MATERIALS SHALL BE ON-SITE
 - 3) GRAVEL PLACEMENT
 - A) END DUMP GRAVEL OVER EXISTING SLOPE
 - B) PUSH OUT AND LEVEL WITH CAT OR EXCAVATOR
 - C) BUILD BERM OUT INTO RIVER AS SIDE SLOPES ALLOW

SCORE OF APPROVAL
ORIGINAL DRAWING

EXPIRES: 8/31/17

NO. _____ DATE _____

REVISION DESCRIPTION _____ DRAWN BY _____ CHECKED BY _____

CITY OF TACOMA
DEPARTMENT OF PUBLIC UTILITIES
LIGHT DIVISION

COMLITZ SALMON HATCHERY
GRAVEL AUGMENTATION PLAN
BORROW & PLACEMENT SITES

DESIGNED	FIELD BOOK
DATE _____	DATE _____
DRAWING NO. _____	SCALE _____
AS SHOWN	

PROJECT: MSR

CHECKED: _____

REV. NO. 0

SHEET _____ OF _____

MP4361