WRIGHT-PIERCE
Engineering a Better Environment

MEMORANDUM

TO:	Todd Shea, KLPD	**DATE:**	5/5/2016
FROM:	Jon Edgerton, Mike Guethle	**PROJECT NO.:**	12397L
SUBJECT:	Efforts Completed by Wright-Pierce since the March Trustees Meeting		

Item 1. Wright-Pierce updated the section of the report discussing the efficiencies of the generating equipment (see updated text included in Section 1 and Appendix C).

Item 2. Wright-Pierce obtained an updated proposal from Bill Clewes (originally solicited in August 2016) to conduct an assessment/report of work recommended to be completed at the three hydro facilities. It was felt that having Bill Clewes conduct such an assessment would likely provide good "bang for the buck", due to his intimate familiarity with the facilities (reference the recent memo from Bill Clewes)

Item 3. Wright-Pierce updated the section of the report discussing "repair versus refurbishment" as it pertains to the hydro facilities. In general, repairs are considered to consist of remedying broken equipment or ancillary elements, whereas refurbishment consists of replacing or reconditioning components, generally to enhance performance or extend operating life. From a fiscal perspective, repairs are often considered as a part of operating expenses, while refurbishment may be considered a capital investment.

Item 4. Wright-Pierce reviewed options and issues associated with increased generation capacity under Alternative 2. For a variety of reasons, not least the limited availability of additional flows, a micro-turbine was determined to be the most feasible and economical option (additional discussion is included in Appendix D). Based on the flow-duration curve contained in the 2011 report, it appears that flows only exceed the listed hydraulic capacity of the current generating equipment about 30 percent of the time. With proposed conditions diverting fish passage flows away from the amount of water than can be used for power generation, this will further lower the availability of untapped river flows to support additional power generation.

Item 5. Wright-Pierce has provided additional information relative to the nature and magnitude of fishways that might be provided under scenarios whereby the dams remain. In reviewing the materials of this nature that were provided by Alden Laboratories in 2011, it appeared that the material is still relevant, hence this document has been included as an Appendix (K) to the updated Alternatives Analysis.

Item 6. Wright-Pierce has conducted additional assessment into shoreline stability and flooding impacts associated with Alternative 4 (dam decommissioning and removal). The effort included conducting additional hydraulic modeling for the segment of the Mousam above the Kesslen Dam, particularly where homes exist in close proximity to the river. The HEC-RAS model was run for both scenarios (dams remain & dams removed) using three flowrates (corresponding to seasonal low flow, FEMA 100-year flood flows and a 100-year flood flow calculated by Wright-Pierce based on standardized regression methodologies). The resulting effort is included in Appendix L of the latest version of the report, and includes a map with reference locations as well as tabulated predictions of elevations and velocities for pre- versus post dam removal conditions. It should be noted that predicted elevations and mean velocities are in regular font for those areas where we have surveyed (bathymetric) cross-section data and in italics for those areas where the river cross-sections have been estimated based on observations coupled with LiDAR based topography.

Item 7. Wright-Pierce has reviewed the report with respect to the discussion of stream morphology and associated erosive factors. The March 22, 2016 draft of the Alternatives Analysis includes discussion of the stream morphology, with narrative included within multiple sections (namely Sections 2 and 5) that includes discussion relative to the physical aspects such as river banks and water velocities, as well as the environmental and biological components (such as impacts on wetlands and aquatic habitats). As noted, further discussion regarding the potential for bank erosion in more developed areas has been added in the context of the review of hydraulics under a dam removal scenario river flows, as contained in Appendix L.

Item 8. Wright-Pierce has confirmed the number of (main stem) river miles of habitat that would be "opened up" for diadromous habitat in the event of removal, or provision of appropriate fish passage, at the three dams. A review of aerial mapping indicates that the number of main stem river miles for which access would be provided is accurate as stated in the March 22, 2016 draft of the Alternatives Report.

Item 9. Wright-Pierce has reformatted how we are presenting "decimal cents" for clarity (Section 6). Cost values within Section 6 are expressed in units of dollars (e.g., a value of 0.1 cents would now be referred to as $0.001).

Item 10. Wright-Pierce has developed and added similar text for Alternatives 2 and 3 in the portion of report (Section 6) that discusses the impact of costs associated with the various alternatives on a typical residential ratepayer. Table 6-4 has likewise been updated to incorporate the cost per generation (In $/kWh) for Alternatives 2 and 3.

Item 11. Wright-Pierce has been provided additional correspondence from stakeholders/residents, and incorporated those materials into the report appendices (Appendix J).

Item 12. It was suggested by representatives of Goose River Hydro (Nicholas Cabral, *et al*.), that fish passage and relicensing could be addressed for roughly half of the W-P estimated figures (Goose River initiated FERC relicensing in May of 2015, and current license expires 2/29/2020 (i.e. 2 years ahead of KLPD). FERC rep is Julia Kolberg @ 202-502-8261). Since the March 29, 2016 meeting, Wright-Pierce has spoken with representatives of federal agencies who confirmed that comparing agency requirements for fish passage on the Goose River to those that should be anticipated for the Mousam River is "apples and oranges". Preliminary indications are that the licensee on the Goose River is likely only to be held to provision of eel passage due to natural barriers that predated the dams. This is emphatically not the case for the Mousam, as both anadromous and catadromous passages are anticipated to be required.

Item 13. Wright-Pierce reviewed the financial analysis based on comments from Mr. Albert Kolf, who had suggested that the analysis fails to take into account the value of power that would have to be purchased if the dams were to be decommissioned. In the current financial model, the value associated with energy generation is treated as an avoided cost of purchasing non-generated power beyond year 2022. Alternative 4 indicates zero avoided cost after 2022, while Alternative 1 indicates significant avoided cost extending to 2062. From the perspective of comparing the two alternatives, this is the same as assuming a corresponding value for power that would need to be purchased under a scenario where the generation ceases in 2022.

Item 14. Wright-Pierce adjusted the report (primarily within Section 1 And Appendix C) to address some apparent inconsistencies identified by Mr. Peter Ashley.

Item 15. Wright-Pierce reviewed the historical generation at the facilities against the annual allowance of 3,200,000 kWh contained in the 1982 water quality certification for the facilities. It should be noted that the certification is based on theoretical outputs and, based on our review of KLPD's operating records, the facilities have never produced 3,200,000 kWh over the course of a calendar year.

Item 16. Wright-Pierce revisited the earlier thought process regarding the decision to conduct initial sediment screening at a single location just upstream of the Kesslen Dam. A key factor in the rationale for this decision was that the Dane Perkins and Twine Mill facilities had been breached more recently than the Kesslen Dam, which presumably resulted in discharge of the bulk of the (older) sediments that had been accumulated within these two impoundments.

Item 17. Wright-Pierce conducted a review of agency comments pertaining to the relative value of warmwater versus coldwater species. In short, we have found little, if any published material or agency input that supports preservation of warmwater habitat on the lower Mousam as an alternative to restoration of the coldwater habitat that is presumed to have existed before construction of the subject dams.