

Final Independent External Peer Review Report Willamette River Basin Review Reallocation Study, Integrated Feasibility Report and Environmental Assessment

Prepared by
Battelle Memorial Institute

Prepared for
Department of the Army
U.S. Army Corps of Engineers
Water Management and Reallocation Planning Center of Expertise
Baltimore District

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Executive Summary

PROJECT BACKGROUND AND PURPOSE

The U.S. Army Corps of Engineers (USACE) operates a system of 13 dams and reservoirs (collectively the Willamette Valley Project) in Oregon's Willamette River basin that provides many benefits to the region and nation. The Willamette Valley Project was authorized by the Flood Control Acts of 1938, 1950, and 1960. The 1938 Act led to the construction of Fern Ridge, Dorena, Cottage Grove, Detroit, and Lookout Point dams.

The 1950 Act greatly expanded the Willamette Project both in the number of projects and the scope, with the Willamette River basin the subject of Volume 5 of the eight-volume Columbia River Basin-wide authorization document (House Document 531). The 1950 Act reauthorized the earlier dams, including Green Peter that had not been started, and added the following dams: Big Cliff Dam on the North Santiam River, Cougar and Blue River dams on the McKenzie River, Hills Creek and Dexter dams on the Middle Fork Willamette River, and Falls Creek Dam on Fall Creek.

The primary planned accomplishment of the projects was to provide flood control. Secondary accomplishments were generation of hydroelectric power, main stem navigation, increased water supplies for irrigation and domestic use, increased low-water flows for improved conditions including fish life, and improved recreational conditions at reservoirs and downstream points.

Independent External Peer Review Process

Independent, objective peer review is regarded as a critical element in ensuring the reliability of scientific analysis. USACE is conducting an Independent External Peer Review (IEPR) of the Willamette River Basin Review Reallocation Study, Integrated Feasibility Report and Environmental Assessment (hereinafter: Willamette Basin Review IEPR). As a 501(c)(3) non-profit science and technology organization, Battelle is independent, is free from conflicts of interest (COIs), and meets the requirements for an Outside Eligible Organization (OEO) per guidance described in USACE (2012). Battelle has experience in establishing and administering peer review panels for USACE and was engaged to coordinate this IEPR. The IEPR was external to the agency and conducted following USACE and Office of Management and Budget (OMB) guidance described in USACE (2012) and OMB (2004). This final report presents the Final Panel Comments of the IEPR Panel (the Panel). Details regarding the IEPR (including the process for selecting panel members, the panel members' biographical information and expertise, and the charge submitted to the Panel to guide its review) are presented in appendices.

Based on the technical content of the decision documents and the overall scope of the project, Battelle identified potential candidates for the Panel in the following key technical areas: Civil Works

planning/economics, hydrology/water resources engineering, and biological resources and environmental law compliance. Battelle screened the candidates to identify those most closely meeting the selection criteria and evaluated them for COIs and availability. USACE was given the list of all the final candidates to independently confirm that they had no COIs, and Battelle made the final selection of the three-person Panel from this list.

The Panel received electronic versions of the decision documents (546 pages in total), along with a charge that solicited comments on specific sections of the documents to be reviewed. Following guidance provided in USACE (2012) and OMB (2004), USACE prepared the charge questions, which were included in the draft and final Work Plans.

The USACE Project Delivery Team (PDT) briefed the Panel and Battelle during a kick-off meeting held via teleconference at the start of the review to provide the Panel an opportunity to ask questions of USACE and clarify uncertainties. Other than Battelle-facilitated teleconferences, there was no direct communication between the Panel and USACE during the peer review process.

IEPR panel members reviewed the decision documents individually and produced individual comments in response to the charge questions. The panel members then met via teleconference with Battelle to review key technical comments and reach agreement on the Final Panel Comments to be provided to USACE. Each Final Panel Comment was documented using a four-part format consisting of (1) a comment statement; (2) the basis for the comment; (3) the significance of the comment (high, medium/high, medium, medium/low, or low); and (4) recommendations on how to resolve the comment. Overall, four Final Panel Comments were identified and documented. Of these, one was identified as having medium significance, two had medium/low significance, and one had low significance.

Battelle received public comments from USACE on the Willamette Basin Review (approximately 42 written comments, emails, and letters, totaling 96 pages of comments) and provided them to the IEPR panel members. The panel members were charged with determining if any information or concerns presented in the public comments raised any additional discipline-specific technical concerns with regard to the Willamette Basin Review IEPR decision documents. After completing its review, the Panel confirmed that no new issues or concerns were identified other than those already covered in the Final Panel Comments.

Results of the Independent External Peer Review

The panel members agreed on their “assessment of the adequacy and acceptability of the economic, engineering, and environmental methods, models, and analyses used” (USACE, 2012; p. D-4) in the Willamette Basin Review IEPR decision documents. Table ES-1 lists the Final Panel Comment statements by level of significance. The full text of the Final Panel Comments is presented in Section 4.2 of this report. The following summarizes the Panel’s findings.

Based on the Panel’s review, the report is extremely thorough and well-written, providing a clear and concise statement of purpose and need, alternatives considered, existing and future water use and availability, and anticipated consequences. The scientific rationale and technical approach are sound and the conclusions are well-founded. The report provided a balanced assessment of the economic, engineering, and environmental issues of the overall project; however, the Panel identified elements of the report that should be clarified or revised.

Plan Formulation and Economics: The Panel believes that the Integrated Feasibility Report/Environmental Assessment (IFR/EA) could be improved by providing the rationale for why the industry goal of 10% unaccounted-for water loss is expected to be achieved in the future condition when it has historically been unattainable (based on the average and median percentages). In addition, the Panel found a contradiction between the text and a table in the discussion about the Conservation Storage Allocation Reallocation Alternative D. Including an explanation in Section 5.2.8 of the reason for the differences in the percent of reduced volume of Willamette Valley Project conservation storage allocated to each use category will address this issue.

Engineering: From an engineering perspective, the Panel notes that the Appendix K hydrologic analysis may overstate the climate trend because the streamflow analysis used historic discharge data that only measured high flows and recent data that may have been influenced by upstream dams. The Panel suggests that a sensitivity analysis be conducted to address this concern.

Environmental: The Panel has found that the IFR/EA could be improved by explaining why the range of alternatives evaluated for this study did not consider measures that would increase the capacity of the reservoir system. Even if this measure had practical limitations and constraints, the IFR/EA should include this discussion to ensure that the document is comprehensive.

Table ES-1. Overview of Four Final Panel Comments Identified by the Willamette Basin Review IEPR Panel

No.	Final Panel Comment
Significance – Medium	
1	The IFR/EA does not explain why the range of alternatives considered did not include measures that would increase the capacity of the reservoir system.
Significance – Medium/Low	
2	The assumption that the study area’s municipal and industrial (M&I) systems will achieve the goal of 10% unaccounted-for water is not supported by evidence.
3	Information presented for Conservation Storage Allocation (acre-feet) Reallocation Alternative D in Table 5-2 contradicts a statement presented in the text.
Significance – Low	
4	The hydrologic analysis in Appendix K may inadvertently overstate the climate trend because of the use of historic discharge data that only measured high flows and more recent flows that may have been influenced by upstream dam construction.

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LIST OF ACRONYMS

ADM	Agency Decision Milestone
AI	Agricultural Irrigation
ATR	Agency Technical Review
BLM	Bureau of Land Management
COI	Conflict of Interest
CWA	Clean Water Act
DrChecks	Design Review and Checking System
EC	Engineer Circular
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
ER	Engineer Regulation
ERDC	Engineer Research and Development Center
ESA	Endangered Species Act
F&W	Fish & Wildlife
FWCA	Fish and Wildlife Coordination Act
HEC-ResSim	Hydrologic Engineering Center Reservoir Simulation (computer model)
HEP	Habitat Evaluation Procedure
IEPR	Independent External Peer Review
IFR/EA	Integrated Feasibility Report/Environmental Assessment
IWR	Institute for Water Resources
M&I	Municipal and Industrial
NEPA	National Environmental Policy Act
OEO	Outside Eligible Organization
OMB	Office of Management and Budget
OPSEC	Operations Security
OWRD	Oregon Water Resources Department
PDT	Project Delivery Team
PFMA	Potential Failure Mode Assessment
SLM	Senior Leader Meeting
USACE	United States Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
TSP	Tentatively Selected Plan

1. INTRODUCTION

The U.S. Army Corps of Engineers (USACE) operates a system of 13 dams and reservoirs (collectively the Willamette Valley Project) in Oregon's Willamette River basin that provides many benefits to the region and nation. The Willamette Valley Project was authorized by the Flood Control Acts of 1938, 1950, and 1960. The 1938 Act led to the construction of Fern Ridge, Dorena, Cottage Grove, Detroit and Lookout Point dams.

The 1950 Act greatly expanded the Willamette Project both in the number of projects and the scope, with the Willamette River basin the subject of Volume 5 of the eight-volume Columbia River Basin-wide authorization document (House Document 531). The 1950 Act reauthorized the earlier dams, including Green Peter that had not been started, and added the following dams: Big Cliff Dam on the North Santiam River, Cougar and Blue River dams on the McKenzie River, Hills Creek and Dexter dams on the Middle Fork Willamette River, and Falls Creek Dam on Fall Creek.

The primary planned accomplishment of the projects was to provide flood control. Secondary accomplishments were generation of hydroelectric power, main stem navigation, increased water supplies for irrigation and domestic use, increased low-water flows for improved conditions including fish life, and improved recreational conditions at reservoirs and downstream points.

Independent, objective peer review is regarded as a critical element in ensuring the reliability of scientific analysis. The objective of the work described here was to conduct an Independent External Peer Review (IEPR) of the Willamette River Basin Review Reallocation Study, Integrated Feasibility Report and Environmental Assessment (hereinafter: Willamette Basin Review IEPR) in accordance with procedures described in the Department of the Army, U.S. Army Corps of Engineers (USACE), Engineer Circular (EC) *Civil Works Review* (EC 1165-2-214) (USACE, 2012) and the Office of Management and Budget (OMB), *Final Information Quality Bulletin for Peer Review* (OMB, 2004). Supplemental guidance on evaluation for conflicts of interest (COIs) was obtained from the *Policy on Committee Composition and Balance and Conflicts of Interest for Committees Used in the Development of Reports* (The National Academies, 2003).

This final report presents the Final Panel Comments of the IEPR Panel (the Panel) on the existing engineering, economic, environmental, and plan formulation analyses contained in the Willamette Basin Review IEPR documents (Section 4). Appendix A describes in detail how the IEPR was planned and conducted, including the schedule followed in executing the IEPR. Appendix B provides biographical information on the IEPR panel members and describes the method Battelle followed to select them. Appendix C presents the final charge to the IEPR panel members for their use during the review; the final charge was submitted to USACE in the final Work Plan according to the schedule listed in Table A-1. Appendix D presents the organizational COI form that Battelle completed and submitted to the Institute for Water Resources (IWR) prior to the award of the Willamette Basin Review IEPR.

2. PURPOSE OF THE IEPR

To ensure that USACE documents are supported by the best scientific and technical information, USACE has implemented a peer review process that uses IEPR to complement the Agency Technical Review (ATR), as described in USACE (2012).

In general, the purpose of peer review is to strengthen the quality and credibility of the USACE decision documents in support of its Civil Works program. IEPR provides an independent assessment of the engineering, economic, environmental, and plan formulation analyses of the project study. In particular, the IEPR addresses the technical soundness of the project study's assumptions, methods, analyses, and calculations and identifies the need for additional data or analyses to make a good decision regarding implementation of alternatives and recommendations.

In this case, the IEPR of the Willamette Basin Review was conducted and managed using contract support from Battelle, which is an Outside Eligible Organization (OEO) (as defined by EC 1165-2-214). Battelle, a 501(c)(3) organization under the U.S. Internal Revenue Code, has experience conducting IEPRs for USACE.

3. METHODS FOR CONDUCTING THE IEPR

The methods used to conduct the IEPR are briefly described in this section; a detailed description can be found in Appendix A. The IEPR was completed in accordance with established due dates for milestones and deliverables as part of the final Work Plan; the due dates are based on the award/effective date and the receipt of review documents.

Battelle identified, screened, and selected three panel members to participate in the IEPR based on their expertise in the following disciplines: Civil Works planning/economics, hydrology/water resources engineering, and biological resources and environmental law compliance. The Panel reviewed the Willamette Basin Review IEPR decision documents and produced four Final Panel Comments in response to 12 charge questions provided by USACE for the review. This charge included two overview questions and one public comment question added by Battelle. Battelle instructed the Panel to develop the Final Panel Comments using a standardized four-part structure:

1. Comment Statement (succinct summary statement of concern)
2. Basis for Comment (details regarding the concern)
3. Significance (high, medium/high, medium, medium/low, or low; in accordance with specific criteria for determining level of significance)
4. Recommendation(s) for Resolution (at least one implementable action that could be taken to address the Final Panel Comment).

Battelle reviewed all Final Panel Comments for accuracy, adherence to USACE guidance (EC 1165-2-214, Appendix D), and completeness prior to determining that they were final and suitable for inclusion in the Final IEPR Report. There was no direct communication between the Panel and USACE during the preparation of the Final Panel Comments. The Panel's findings are summarized in Section 4.1; the Final Panel Comments are presented in full in Section 4.2.

4. RESULTS OF THE IEPR

This section presents the results of the IEPR. A summary of the Panel's findings and the full text of the Final Panel Comments are provided.

4.1 Summary of Final Panel Comments

The panel members agreed on their “assessment of the adequacy and acceptability of the economic, engineering, and environmental methods, models, and analyses used” (USACE, 2012; p. D-4) in the Willamette Basin Review IEPR review documents. The following summarizes the Panel’s findings.

Based on the Panel’s review, the report is extremely thorough and well-written, providing a clear and concise statement of purpose and need, alternatives considered, existing and future water use and availability, and anticipated consequences. The scientific rationale and technical approach are sound and the conclusions are well-founded. The report provided a balanced assessment of the economic, engineering, and environmental issues of the overall project; however, the Panel identified elements of the report that should be clarified or revised.

Plan Formulation and Economics: The Panel believes that the Integrated Feasibility Report/Environmental Assessment (IFR/EA) could be improved by providing the rationale for why the industry goal of 10% unaccounted-for water loss is expected to be achieved in the future condition when it has historically been unattainable (based on the average and median percentages). In addition, the Panel found a contradiction between the text and a table in the discussion about the Conservation Storage Allocation Reallocation Alternative D. Including an explanation in Section 5.2.8 of the reason for the differences in the percent of reduced volume of Willamette Valley Project conservation storage allocated to each use category will address this issue.

Engineering: From an engineering perspective, the Panel notes that the Appendix K hydrologic analysis may overstate the climate trend because the streamflow analysis used historic discharge data that only measured high flows and recent data that may have been influenced by upstream dams. The Panel suggests that a sensitivity analysis be conducted to address this concern.

Environmental: The Panel has found that the IFR/EA could be improved by explaining why the range of alternatives evaluated for this study did not consider measures that would increase the capacity of the reservoir system. Even if this measure had practical limitations and constraints, the IFR/EA should include this discussion to ensure that the document is comprehensive.

4.2 Final Panel Comments

This section presents the full text of the Final Panel Comments prepared by the IEPR panel members.

Final Panel Comment 1

The IFR/EA does not explain why the range of alternatives considered did not include measures that would increase the capacity of the reservoir system.

Basis for Comment

The IFR/EA does not clearly state why structural measures to increase water storage capacity of the reservoir system were dismissed from further consideration in the alternatives analysis. The IFR/EA summarizes the complexity of water rights in Oregon and points out that the Oregon Water Resources Department (OWRD) is responsible for issuing permits for withdrawal of stored water and for new surface water uses. Section 4.2.1 lists non-structural and structural measures that could be considered to meet increased future demand for municipal and industrial (M&I) systems, but states that "...expansion of existing withdrawal rights or the establishment of new surface water diversions for peak season use" was dismissed from consideration in the alternatives analysis because of "practical limitations" (p. 68). These practical limitations were not identified or described. The IFR/EA does not provide a thorough discussion on what constraints might exist on structural measures that would increase the storage capacity of the Willamette Valley Project so as to meet predicted future increases in demand.

Significance – Medium

Adding a structural measure as a possible alternative would be unlikely to alter the range of alternatives given full consideration, but it would provide a more complete discussion of the basis for selection of the alternatives that are presented.

Recommendations for Resolution

1. Add a structural measure alternative (storage capacity increase) in Section 4.2.1.
2. Discuss specific practical limitations and constraints on implementation of structural measures to meet potential future peak season demands.

Final Panel Comment 2

The assumption that the study area’s M&I systems will achieve the goal of 10% unaccounted-for water is not supported by evidence.

Basis for Comment

Appendix A (p. 19) states that “the overall average unaccounted-for water is 15 percent, the median is 13 percent, and the maximum unaccounted-for water ranges between 19 and 59 percent within the various population categories. A common goal of 10 percent unaccounted-for water is stated by most of the planning documents and is often cited in literature as an industry goal.” In Appendix A (p. 25), the third generality listed states: “Specifically-noted demand projections in the tables reflect the study area M&I systems’ assumed achievement of that goal.” The appendix does not provide a rationale for the 10% unaccounted-for water assumption, especially in light of the report’s statement that the average is 15% and that the maximum amount ranges widely above that average (the U.S. Environmental Protection Agency [USEPA] reports an average loss in systems of 16% [USEPA, 2013]). Using an optimistic assumption that a 10% unaccounted-for water goal could be achieved may significantly understate future M&I water demand projections.

Significance – Medium/Low

Understating the water loss percentage results in future water demand projections short of what are likely to be experienced.

Recommendations for Resolution

1. Provide the rationale for why the industry goal of 10% is expected to be achieved in the future condition when it has historically been unattainable.
2. If a rationale cannot be provided, recalculate the water demand projections using the overall average or median unaccounted-for water percentages.

Literature Cited

USEPA (2013). Water Audits and Water Loss Control for Public Water Systems. U.S. Environmental Protection Agency, Office of Water (4606M), EPA-816-F-13-002. July 2013.

Final Panel Comment 3

Information presented for Conservation Storage Allocation (acre-feet) Reallocation Alternative D in Table 5-2 contradicts a statement presented in the text.

Basis for Comment

In Section 5.2.7 (p. 82), the report states that “The reduction to the Fish & Wildlife (F&W) allocation under Reallocation Alternative D mirrors the reduction imposed on the combined Municipal & Industrial (M&I) and Agricultural Irrigation (AI) peak demand volumes for this alternative.” However, in Table 5-2 (p. 84), the information presented for Reallocation Alternative D shows a reduction of 39.5 percent for F&W, a reduction of 54.1 percent for M&I, and a reduction 22.5 percent for AI. The text implies that the reductions should be equal percentages, while the table indicates that those reductions are not equal.

Significance – Medium/Low

Incomplete or inconsistent technical information leads to uncertainty regarding whether the missing information will affect the selection of, justification of, or ability to implement the recommended plan.

Recommendations for Resolution

1. Include a straightforward explanation in Section 5.2.8 of the reason for the differences in the percent of reduced volume of Willamette Valley Project conservation storage allocated to each use category.

Final Panel Comment 4

The hydrologic analysis in Appendix K may inadvertently overstate the climate trend because of the use of historic discharge data that only measured high flows and more recent flows that may have been influenced by upstream dam construction.

Basis for Comment

Section 4 of Appendix K notes that the observed streamflow trends analysis only had the capability to analyze annual peak flows. It was also noted that the Nonstationary Assessment Tool website was under construction and not accessible at the time of the streamflow trends analysis. A streamflow trends analysis based only on annual peak flows may be of limited value in the case of the Willamette Basin Region where the water issue is more related to total volume and timing of the runoff over a water year. Furthermore, the three highest discharge events in the entire record are from approximately 1860 to 1890. It is often the case that only high flows are recorded in old records and that little, if any, information is available on lower-flow, more common events. Without corresponding lower peak flow data (which may potentially counterbalance the high flows), the regression may be skewed to a degree by these three data points. The IFR/EA does not provide information on the confidence level for these three data points.

Section 4 of Appendix K also notes that more recent data contain flood records that were affected by the influence of upstream dams constructed between 1941 and 1969. Over this time period, the dams likely had an increasing impact on the peak discharge of flood events. Furthermore, once all the dams were completed and fully operational, the peak flow record may have flattened. Finally, Appendix K (Figure 4.3, p. 16) states “Strong consensus of statistically significant decreasing trends have been identified in the regions streamflow...”. While this statement is noted as being a key point from another report, the statement may appear to be overly confident when compared to the statements in Section 4, noting the limitations of the analysis for this study and in light of an analysis that may inadvertently overpredict the climate trend.

Significance – Low

Although this streamflow analysis was not actively used in the overall study projections, this issue could lead to misunderstanding of the results.

Recommendations for Resolution

1. Review the historic record to see if any other flow data exist from 1860 to 1890.
2. Review the three historic data points from 1860 to 1890 to ensure that the estimated discharges noted are accurate.
3. Perform a sensitivity analysis to see what would happen to the regression if the estimated discharge for these three points was high by 10%, 20%, or if one or more of the three data points did not exist.
4. Review Section 4 of Appendix K for the appearance of any conflicts between the different sets of information with the comment, “Strong consensus of statistically significant decreasing trends have been identified in the regions streamflow...” If a potential conflict is apparent, consider adding a paragraph to the end of Appendix K describing the variability inherent within the analyses and/or explaining how this section was used in the overall Willamette Basin Region analysis.

5. REFERENCES

OMB (2004). Final Information Quality Bulletin for Peer Review. Executive Office of the President, Office of Management and Budget, Washington, D.C. Memorandum M-05-03. December 16.

The National Academies (2003). Policy on Committee Composition and Balance and Conflicts of Interest for Committees Used in the Development of Reports. The National Academies (National Academy of Science, National Academy of Engineering, Institute of Medicine, National Research Council). May 12.

USACE (2012). Water Resources Policies and Authorities: Civil Works Review. Engineer Circular (EC) 1165-2-214. Department of the Army, U.S. Army Corps of Engineers, Washington, D.C. December 15.

USEPA (2013). Water Audits and Water Loss Control for Public Water Systems. U.S. Environmental Protection Agency, Office of Water (4606M), EPA-816-F-13-002. July 2013.

APPENDIX A

IEPR Process for the Willamette Basin Review Project

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A.1 Planning and Conduct of the Independent External Peer Review (IEPR)

Table A-1 presents the major milestones and deliverables of the Willamette Basin Review IEPR. Due dates for milestones and deliverables are based on the award/effective date listed in Table A-1. The review documents were provided by U.S. Army Corps of Engineers (USACE) on November 30, 2017. Note that the actions listed under Task 6 occur after the submission of this report. Battelle anticipates submitting the pdf printout of the USACE's Design Review and Checking System (DrChecks) project file (the final deliverable) on April 27, 2018. The actual date for contract end will depend on the date that all activities for this IEPR are conducted and subsequently completed.

Table A-1. Major Milestones and Deliverables of the Willamette Basin Review IEPR

Task	Action	Due Date
1	Award/Effective Date	11/17/2017
	Review documents available	11/30/2017
	Public comments received from USACE	1/11/2018
	Battelle submits draft Work Plan ^a	12/11/2017
	USACE provides comments on draft Work Plan	12/18/2017
	Battelle submits final Work Plan ^a	12/22/2017
2	Battelle requests input from USACE on the conflict of interest (COI) questionnaire	12/4/2017
	USACE provides comments on COI questionnaire	12/4/2017
	Battelle submits list of selected panel members ^a	12/18/2017
	USACE confirms the panel members have no COI	12/19/2017
	Battelle completes subcontracts for panel members	12/22/2017
	Subcontractors complete mandatory Operations Security (OPSEC) training	1/21/2018
3	Battelle convenes kick-off meeting with USACE	12/7/2017
	Battelle sends review documents to panel members	1/8/2018
	Battelle convenes kick-off meeting with panel members	1/8/2018
	Battelle convenes kick-off meeting with USACE and panel members	1/8/2018
	Battelle convenes mid-review teleconference for panel members to ask clarifying questions of USACE	1/22/2018
	Battelle participates in the Agency Decision Milestone (ADM) Meeting	3/22/2018
	Battelle participates in the Senior Leader Meeting (SLM)	5/30/2018
4	Panel members complete their review of the documents	2/1/2018
	Battelle provides talking points to panel members for Panel Review Teleconference	2/5/2018
	Battelle convenes Panel Review Teleconference	2/5/2018
	Battelle provides Final Panel Comment templates and instructions to panel members	2/5/2018
	Panel members provide draft Final Panel Comments to Battelle	2/12/2018
	Battelle provides feedback to panel members on draft Final Panel Comments; panel members revise Final Panel Comments	2/13/2018 - 2/15/2018

Table A-1. Major Milestones and Deliverables of the Willamette Basin Review IEPR, continued

Task	Action	Due Date
4	Panel finalizes Final Panel Comments	2/16/2018
	Battelle receives public comments from USACE	1/11/2018
	Battelle sends public comments to Panel	2/2/2018
	Panel members complete their review of the public comments	2/8/2018
	Battelle and Panel review Panel's responses to public comments	2/9/2018
	Panel drafts Final Panel Comment on public comments, if necessary	Did not occur; no new comments identified
	Panel finalizes Final Panel Comment regarding public comments, if necessary	
5	Battelle provides Final IEPR Report to panel members for review	2/16/2018
	Panel members provide comments on Final IEPR Report	2/20/2018
	Battelle submits Final IEPR Report to USACE^a	2/22/2018
	USACE Planning Center of Expertise (PCX) provides decision on Final IEPR Report acceptance	3/1/2018
6 ^b	Battelle inputs Final Panel Comments to Design Review and Checking System (DrChecks) and provides Final Panel Comment response template to USACE	3/13/2018
	Battelle convenes teleconference with USACE to review Comment Response process	3/13/2018
	Battelle convenes teleconference with Panel to review Comment Response process	3/13/2018
	USACE Project Delivery Team (PDT) provides draft Evaluator Responses to USACE PCX for review	3/27/2018
	USACE PCX reviews draft Evaluator Responses and works with USACE PDT regarding clarifications to responses, if needed	4/2/2018
	USACE PCX provides draft PDT Evaluator Responses to Battelle	4/3/2018
	Battelle provides draft PDT Evaluator Responses to panel members	4/5/2018
	Panel members provide draft BackCheck Responses to Battelle	4/10/2018
	Battelle convenes teleconference with panel members to discuss draft BackCheck Responses	4/11/2018
	Battelle convenes Comment Response Teleconference with panel members and USACE	4/12/2018
	USACE inputs final PDT Evaluator Responses to DrChecks	4/19/2018
	Battelle provides final PDT Evaluator Responses to panel members	4/20/2018
	Panel members provide final BackCheck Responses to Battelle	4/25/2018
	Battelle inputs the panel members' final BackCheck Responses to DrChecks	4/26/2018
	Battelle submits pdf printout of DrChecks project file ^a	4/27/2018
	Contract End/Delivery Date	10/30/2018

^a Deliverable.

^b Task 6 occurs after the submission of this report.

At the beginning of the Period of Performance for the Willamette Basin Review IEPR, Battelle held a kick-off meeting with USACE to review the preliminary/suggested schedule, discuss the IEPR process, and address any questions regarding the scope (e.g., terminology to use, access to DrChecks, etc.). Any revisions to the schedule were submitted as part of the final Work Plan. The final charge consisted of twelve charge questions provided by USACE, two overview questions and one public comment question added by Battelle (all questions were included in the draft and final Work Plans), and general guidance for the Panel on the conduct of the peer review (provided in Appendix C of this final report).

Prior to beginning their review and after their subcontracts were finalized, all the members of the Panel attended a kick-off meeting via teleconference planned and facilitated by Battelle in order to review the IEPR process, the schedule, communication procedures, and other pertinent information for the Panel. Battelle planned and facilitated a second kick-off meeting via teleconference during which USACE presented project details to the Panel. Before the meetings, the IEPR Panel received an electronic version of the final charge, as well as the review documents and reference/supplemental materials listed in Table A-2.

Table A-2. Documents to Be Reviewed and Provided as Reference/Supplemental Information

Review Documents	No. of Review Pages
Willamette Basin Review Feasibility Study Integrated Feasibility Report and Environmental Assessment	172
Appendix A: M&I Demand and Supply Analysis	73
Appendix B: Agricultural Irrigation Demand Analysis	102
Appendix C: Calculation of Water Volumes Required to Meet Willamette BiOp Minimum Flows for April through October	177
Appendix K: Discussion of Climate Change Impact on Future Regulation	22
Total Number of Review Pages	546
Supplemental Information ^a	
Appendix D: Flow Dataset Used for ResSim Analyses	32
Appendix E: ResSim Analysis for 2008 Baseline Flow Dataset	135
Appendix F: ResSim WVP Releases and Live Flow Diversions for Base Year 2020, No Action Alternative, and TSP Model Runs	37
Appendix G: ResSim Analysis for Base Year 2020, No Action Alternative 2050, and Tentatively Selected Plan 2050	170
Appendix H: BiOp Flow Objective Performance of the No Action Alternative and Tentatively Selected Plan Under Expected and Peak Demand Conditions	67
Appendix I: Reservoir-Related Boating Recreation Benefits Impact Analyses	18
Appendix J: Hydropower Impacts Analysis	10
Public Comments ^b	100
Total Number of Reference Pages	569

^a Supporting documentation only. These documents are not for Panel review and should be used as information sources only. They are not included in the total page count.

^b USACE will submit public comments to Battelle upon their availability according to the schedule in Table A-1. Battelle will in turn submit the comments to the IEPR Panel for review.

In addition to the materials provided in Table A-2, the panel members were provided the following USACE guidance documents.

- USACE guidance, *Civil Works Review* (EC 1165-2-214), December 15, 2012
- Office of Management and Budget, *Final Information Quality Bulletin for Peer Review*, December 16, 2004.

The Panel did not have any clarifying questions for USACE during the course of their review. Therefore, Battelle determined and the Planning Center of Expertise (PCX) confirmed that a mid-review teleconference with USACE was not necessary.

In addition, USACE provided one document during the course of the review, at the request of panel members: the Willamette Basin Review Feasibility Study, Preliminary Draft Biological Assessment (December 2017). This document was provided to Battelle and then sent to the Panel as additional information only and was not part of the official review.

A.2 Review of Individual Comments

The Panel was instructed to address the charge questions/discussion points within a charge question response form provided by Battelle. At the end of the review period, the Panel produced individual comments in response to the charge questions/discussion points. Battelle reviewed the comments to identify overall recurring themes, areas of potential conflict, and other overall impressions. At the end of the review, Battelle summarized the individual comments into a preliminary list of overall comments and discussion points. Each panel member's individual comments were shared with the full Panel.

A.3 IEPR Panel Teleconference

Battelle facilitated a teleconference with the Panel so that the panel members could exchange technical information. The main goal of the teleconference was to identify which issues should be carried forward as Final Panel Comments in the Final IEPR Report and decide which panel member should serve as the lead author for the development of each Final Panel Comment. This information exchange ensured that the Final IEPR Report would accurately represent the Panel's assessment of the project, including any conflicting opinions. The Panel engaged in a thorough discussion of the overall positive and negative comments, added any missing issues of significant importance to the findings, and merged any related individual comments. At the conclusion of the teleconference, Battelle reviewed each Final Panel Comment with the Panel, including the associated level of significance, and confirmed the lead author for each comment.

A.4 Preparation of Final Panel Comments

Following the teleconference, Battelle distributed a summary memorandum for the Panel documenting each Final Panel Comment (organized by level of significance). The memorandum provided the following detailed guidance on the approach and format to be used to develop the Final Panel Comments for the Willamette Basin Review IEPR:

- **Lead Responsibility:** For each Final Panel Comment, one panel member was identified as the lead author responsible for coordinating the development of the Final Panel Comment and submitting it to Battelle. Battelle modified lead assignments at the direction of the Panel. To assist each lead in the development of the Final Panel Comments, Battelle distributed a summary email

detailing each draft final comment statement, an example Final Panel Comment following the four-part structure described below, and templates for the preparation of each Final Panel Comment.

- Directive to the Lead: Each lead was encouraged to communicate directly with the other panel members as needed and to contribute to a particular Final Panel Comment. If a significant comment was identified that was not covered by one of the original Final Panel Comments, the appropriate lead was instructed to draft a new Final Panel Comment.
- Format for Final Panel Comments: Each Final Panel Comment was presented as part of a four-part structure:
 1. Comment Statement (succinct summary statement of concern)
 2. Basis for Comment (details regarding the concern)
 3. Significance (high, medium/high, medium, medium/low, and low; see description below)
 4. Recommendation(s) for Resolution (see description below).
- Criteria for Significance: The following were used as criteria for assigning a significance level to each Final Panel Comment:
 1. **High:** There is a fundamental issue within study documents or data that will influence the technical or scientific basis for selection of, justification of, or ability to implement the recommended plan.
 2. **Medium/High:** There is a fundamental issue within study documents or data that has a strong probability of influencing the technical or scientific basis for selection of, justification of, or ability to implement the recommended plan.
 3. **Medium:** There is a fundamental issue within study documents or data that has a low probability of influencing the technical or scientific basis for selection of, justification of, or ability to implement the recommended plan.
 4. **Medium/Low:** There is missing, incomplete, or inconsistent technical or scientific information that affects the clarity, understanding, or completeness of the study documents, and there is uncertainty whether the missing information will affect the selection of, justification of, or ability to implement the recommended plan.
 5. **Low:** There is a minor technical or scientific discrepancy or inconsistency that affects the clarity, understanding, or completeness of the study documents but does not influence the selection of, justification of, or ability to implement the recommended plan.
- Guidelines for Developing Recommendations: The recommendation section was to include specific actions that USACE should consider to resolve the Final Panel Comment (e.g., suggestions on how and where to incorporate data into the analysis, how and where to address insufficiencies, areas where additional documentation is needed).

Battelle reviewed and edited the Final Panel Comments for clarity, consistency with the comment statement, and adherence to guidance on the Panel's overall charge, which included ensuring that there

were no comments regarding either the appropriateness of the selected alternative or USACE policy. At the end of this process, four Final Panel Comments were prepared and assembled. There was no direct communication between the Panel and USACE during the preparation of the Final Panel Comments. The full text of the Final Panel Comments is presented in Section 4.2 of the main report.

A.5 Conduct of the Public Comment Review

Following the schedule in Table A-1, Battelle received a PDF file containing 96 pages of public comments on the Willamette Basin Review (approximately 42 written comments, emails, and letters) from USACE. Battelle then sent the public comments to the panel members in addition to the following charge question:

- 1. Do the public comments raise any additional discipline-specific technical concerns with regard to the overall report?**

Upon review, Battelle determined and the Panel confirmed that no new issues or concerns were identified other than those already covered in the Final Panel Comments.

A.6 Final IEPR Report

After concluding the review and preparation of the Final Panel Comments, Battelle prepared a final IEPR report (this document) on the overall IEPR process and the IEPR panel members' findings. Each panel member and Battelle technical and editorial reviewers reviewed the IEPR report prior to submission to USACE for acceptance.

A.7 Comment Response Process

As part of Task 6, Battelle will enter the four Final Panel Comments developed by the Panel into USACE's Design Review and Checking System (DrChecks), a Web-based software system for documenting and sharing comments on reports and design documents, so that USACE can review and respond to them. USACE will provide responses (Evaluator Responses) to the Final Panel Comments, and the Panel will respond (BackCheck Responses) to the Evaluator Responses. All USACE and Panel responses will be documented by Battelle. Battelle will provide USACE and the Panel a pdf printout of all DrChecks entries, through comment closeout, as a final deliverable and record of the IEPR results.

APPENDIX B

Identification and Selection of IEPR Panel Members for the
Willamette Basin Review Project

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B.1 Panel Identification

The candidates for the Willamette River Basin Review Reallocation Study, Integrated Feasibility Report and Environmental Assessment (hereinafter: Willamette Basin Review IEPR) Panel were evaluated based on their technical expertise in the following key areas: Civil Works planning/economics, hydrology/water resources engineering, and biological resources and environmental law compliance. These areas correspond to the technical content of the review documents and overall scope of the Willamette Basin Review project.

To identify candidate panel members, Battelle reviewed the credentials of the experts in Battelle’s Peer Reviewer Database, sought recommendations from colleagues, contacted former panel members, and conducted targeted Internet searches. Battelle evaluated these candidate panel members in terms of their technical expertise and potential conflicts of interest (COIs). Of these candidates, Battelle chose the most qualified individuals, confirmed their interest and availability, and ultimately selected three experts for the final Panel. The remaining candidates were not proposed for a variety of reasons, including lack of availability, disclosed COIs, or lack of the precise technical expertise required.

Candidates were screened for the following potential exclusion criteria or COIs. These COI questions were intended to serve as a means of disclosure in order to better characterize a candidate’s employment history and background. Battelle evaluated whether scientists in universities and consulting firms that are receiving USACE-funding have sufficient independence from USACE to be appropriate peer reviewers. Guidance in OMB (2004, p. 18) states,

“...when a scientist is awarded a government research grant through an investigator-initiated, peer-reviewed competition, there generally should be no question as to that scientist's ability to offer independent scientific advice to the agency on other projects. This contrasts, for example, to a situation in which a scientist has a consulting or contractual arrangement with the agency or office sponsoring a peer review. Likewise, when the agency and a researcher work together (e.g., through a cooperative agreement) to design or implement a study, there is less independence from the agency. Furthermore, if a scientist has repeatedly served as a reviewer for the same agency, some may question whether that scientist is sufficiently independent from the agency to be employed as a peer reviewer on agency-sponsored projects.”

Panel Conflict of Interest (COI) Screening Statements for the Willamette River Basin Review Reallocation Study, Integrated Feasibility Report and Environmental Assessment

1. Direct or indirect involvement by you or your firm in any part of the development or review of the Willamette River Basin Review Reallocation Study, Integrated Feasibility Report and Environmental Assessment (Willamette Basin Review). If yes, please explain.
2. Previous and/or current involvement by you or your firm in water supply and reallocation projects or hydropower projects in the Pacific Northwest.
3. Previous and/or current involvement by you or your firm in U.S. Army Corps of Engineers (USACE) water supply and reallocation projects and hydropower projects in the Pacific Northwest.
4. Current employment by the U.S. Army Corps of Engineers (USACE).

Panel Conflict of Interest (COI) Screening Statements for the Willamette River Basin Review Reallocation Study, Integrated Feasibility Report and Environmental Assessment

5. Previous and/or current involvement with paid or unpaid expert testimony related to the Willamette Basin Review.
6. Previous and/or current employment or affiliation with members of the cooperating agencies or local sponsors: Oregon Water Resources Department (OWRD), Bonneville Power Administration, U.S. Bureau of Reclamation, National Marine Fisheries Service, U.S. Fish and Wildlife Service, Bureau of Land Management, and/or U.S. Forest Service (for pay or pro bono).
7. Past, current, or future interests or involvements (financial or otherwise) by you, your spouse, or your children related to the Willamette River Basin.
8. Current personal involvement with other USACE projects, including whether involvement was to author any manuals or guidance documents for USACE. If yes, provide titles of documents or description of project, dates, and location (USACE district, division, Headquarters, Engineer Research and Development Center [ERDC], etc.), and position/role. Please highlight and discuss in greater detail any projects that are specifically with the Portland District.
9. Previous or current involvement with the development or testing of models that will be used for, or in support of, the project.
10. Current firm involvement with other USACE projects, specifically those projects/contracts that are with the Portland District. If yes, provide title/description, dates, and location (USACE district, division, Headquarters, ERDC, etc.), and position/role. Please also clearly delineate the percentage of work you personally are currently conducting for the Portland District. Please explain.
11. Any previous employment by USACE as a direct employee, notably if employment was with the Portland District. If yes, provide title/description, dates employed, and place of employment (district, division, Headquarters, ERDC, etc.), and position/role.
12. Any previous employment by USACE as a contractor (either as an individual or through your firm) within the last 10 years, notably if those projects/contracts are with the Portland District. If yes, provide title/description, dates employed, and place of employment (district, division, Headquarters, ERDC, etc.), and position/role.
13. Previous experience conducting technical peer reviews. If yes, please highlight and discuss any technical reviews concerning water supply and reallocation studies or hydropower studies and include the client/agency and duration of review (approximate dates).
14. Pending, current, or future financial interests in the Willamette Basin Review-related contracts/awards from USACE.
15. Significant portion of your personal or office's revenues within the last three years came from USACE contracts.
16. Significant portion of your personal or office's revenues within the last three years came from OWRD contracts.

Panel Conflict of Interest (COI) Screening Statements for the Willamette River Basin Review Reallocation Study, Integrated Feasibility Report and Environmental Assessment

- 17. Any publicly documented statement (including, for example, advocating for or discouraging against) related to the Willamette Basin Review.
- 18. Participation in relevant prior and/or current Federal studies relevant to the Willamette Basin Review.
- 19. Previous and/or current participation in prior non-Federal studies relevant to the Willamette Basin Review.

Providing a positive response to a COI screening question did not automatically preclude a candidate from serving on the Panel. For example, participation in previous USACE technical peer review committees and other technical review panel experience was included as a COI screening question. A positive response to this question could be considered a benefit. The term “firm” in a screening question referred to any joint venture in which a firm was involved. It applied to whether that firm serves as a prime or as a subcontractor to a prime. Candidates were asked to clarify the relationship in the screening questions.

B.2 Panel Selection

In selecting the final members of the Panel, Battelle chose experts who best fit the expertise areas and had no COIs. Table B-1 provides information on each panel member’s affiliation, location, education, and overall years of experience. Battelle established subcontracts with the panel members when they indicated their willingness to participate and confirmed the absence of COIs through a signed COI form. USACE was given the list of candidate panel members, but Battelle selected the final Panel.

Table B-1. Willamette Basin Review IEPR Panel: Summary of Panel Members

Name	Affiliation	Location	Education	P.E.	Exp. (yrs)
Civil Works Planning/Economics					
Donald Ator	Independent Consultant	Baton Rouge, LA	M.S., Economics and Agriculture Economics	N/A	40
Hydrology/Water Resources Engineering					
Richard Voigt	Voigt Consultants, LLC	South St. Paul, MN	M.S., Civil Engineering/Water Resource Engineering	Yes	32
Biological Resources and Environmental Law Compliance					
Barry Vittor	Barry A. Vittor & Associates, Inc.	Mobile, AL	Ph.D., Ecology	NA	40+

Table B-2 presents an overview of the credentials of the final three members of the Panel and their qualifications in relation to the technical evaluation criteria. More detailed biographical information on the panel members and their areas of technical expertise is given in Section B.3.

Table B-2. Willamette Basin Review IEPR Panel: Technical Criteria and Areas of Expertise

Technical Criterion	Ator	Voigt	Vittor
Civil Works Planner/Economist			
Minimum of 15 years of demonstrated experience in economics	X		
Experience in water resource planning, including experience with water supply reallocation studies	X		
Familiar with U.S. Army Corps of Engineers (USACE) plan formulation processes, procedures, and standards as they relate to Civil Works projects	X		
Minimum of five years of experience directly dealing with the USACE six-step planning process and policies, which are governed by Engineer Regulation (ER) 1105-2-100, Planning Guidance Notebook	X		
M.S. degree or higher in economics	X		
Hydrologist/Water Resources Engineer			
Minimum of 15 years of experience in hydrologic and water resources studies		X	
Familiar with the Hydrologic Engineering Center’s Reservoir Simulation (HEC-ResSim 3.2) computer model		X	
Biological Resources and Environmental Law Compliance Expert			
Minimum of 15 years of experience directly related to water resources environmental evaluation or review			X
At least 10 years of experience in evaluating and conducting National Environmental Policy Act (NEPA) impact assessments			X
Familiar and has experience with:			
Endangered Species Act (ESA)			X
Clean Water Act (CWA)			X
Essential Fish Habitat (EFH)			X
Fish and Wildlife Coordination Act (FWCA)			X
M.S. degree or higher in related field			X

B.3 Panel Member Qualifications

Detailed biographical information on each panel members’ credentials and qualifications and areas of technical expertise are summarized in the following paragraphs.

Name	Donald Ator
Role	Civil Works Planner/Economist
Affiliation	Independent Consultant

Mr. Ator is an independent consultant and serves as Research Associate, Professor, and Undergraduate Advisor in the Department of Agriculture Economics and Agribusiness at Louisiana State University. He earned his M.S. in economics and agriculture economics in 1978 and his M.B.A. with a concentration in finance and accounting in 1984, both from Louisiana State University. Mr. Ator’s current research is in financial resiliency planning for local governments in Louisiana, Texas, Alabama, Mississippi, Florida, Georgia, Kentucky, and Nebraska.

Mr. Ator has 40 years of experience working for 26 USACE districts, first as a full-time employee with USACE Vicksburg District for one year, and then in the private sector with a not-for-profit research institute and three architect-engineer firms. He has conducted more than 500 water resources studies and technical reviews nationwide of USACE water resources projects for flood and/or storm damage risk reduction, ecosystem restoration, navigation, shoreline protection, and watershed planning. Relevant studies include Reallocation of Storage from Flood Control to Hydropower, Economics Analysis, Greer’s Ferry Lake, Arizona (USACE Little Rock District); Richard B. Russell Reservoir Reallocation of Storage and Pumped Storage Facility Permit Application, Economic Analysis, Savannah River, Georgia and South Carolina, (South Carolina Public Service Authority/Santee Cooper Electric Cooperative and USACE Savannah District); San Diego County Water Supply Feasibility Study, California (USACE Los Angeles District); Economic Analysis of Agricultural Flood Damages and Evaluation of the Impacts of Operational Changes, Lac Qui Parle Reservoir and the Minnesota River, Minnesota, (USACE St. Paul District); and Alternatives Analysis of Eastex Reservoir, Cherokee County, Texas (U.S. Environmental Protection Agency [EPA], Region IV).

Mr. Ator has worked extensively with USACE conducting Civil Works planning/economics studies in accordance with Engineer Regulation (ER) 1105-2-100 and other pertinent guidance, laws, and regulations applicable to the USACE Six-Step Planning Process and Engineer Circular (EC) 1165-2-209 review requirements. Representative studies include the Sensitivity Analysis of Benefit and Cost Evaluation Criteria to Risk and Uncertainty Associated with Study Parameters, Passaic River Basin, New Jersey (USACE New York District) and the Licking River Watershed and Dillon Lake Ecosystem Restoration Project Feasibility Study, Ohio (USACE Huntington District). He has participated in two IEPRs of Federal water resources planning documents justifying construction of Civil Works projects: Grays Harbor, Washington, Navigation Improvement Project (USACE Seattle District) and Sutter Basin Pilot Feasibility Study (USACE Sacramento District).

Mr. Ator’s demonstrated proficiency in the USACE study process is evidenced by his development of a template for preparing project management plans for feasibility studies for the USACE Regional Planning and Environment Division South, Mississippi Valley Division in 2011, as well as field testing the template in 2012. He has economic and Civil Works planning experience in the Pacific Northwest, having served as the project manager and senior economist for Commodity and Fleet Forecast for the Columbia River,

Oregon and Washington (USACE Portland District); Preparation of a Financial Resources Handbook, Oregon (USACE Portland District); Kane Springs Valley, Ground Water Development Project Environmental Impact Statement (EIS), Nevada (U.S. Department of the Interior, Bureau of Land Management [BLM]); Forecast of Commodity Flows, Northern Sea Route Reconnaissance Study, Alaska (USACE Alaska District); Lincoln County Land Act Groundwater Development and Utility Right-of-Way Project EIS, Nevada and Utah (U.S. Department of the Interior, BLM); and Initial Appraisal of Rock Removal at San Francisco Bar Channel, San Francisco, California (USACE San Francisco District).

Mr. Ator is actively involved in related professional engineering and scientific societies, including the Society of American Military Engineers and the American Society of Civil Engineers.

Name	Rick Voigt, P.E.
Role	Hydrologist and Water Resources Engineer
Affiliation	Voigt Consultants, LLC

Mr. Voigt is the President of Voigt Consultants LLC in South St. Paul, Minnesota, and is a registered Professional Engineer in Minnesota and Wisconsin. He earned his M.S. in civil engineering/water resource engineering from the University of Minnesota in 1985 and has 32 years of experience in hydraulic engineering and hydrology, specializing in the fields of dam and water resources engineering and complex hydraulic analyses and modeling. Much of his project experience is focused in the areas of hydropower, dams and spillways, numerical and physical hydraulic modeling, and hydrology, requiring the use of 1-, 2- and 3-dimensional models to evaluate flow patterns in rivers and near dams, spillways, and inlet and outlet structures. He has worked on a variety of reservoir optimization studies using USACE's Hydrologic Engineering Center Reservoir Simulation computer model (HEC-ResSim) and other routines, including those developed in-house.

Mr. Voigt has worked on several dam breach and related dam safety analysis projects and studies. Relevant studies include assessment modeling of breach formation and propagation in an area of vegetated natural soils that functions as an emergency spillway at the Cheboygan Dam in Michigan; the breach analysis to evaluate the water surface elevations created by the failure of Sylvan Dam, Minnesota; and the evaluation of spillway alternatives to increase the capacity of Pillager Dam to meet the Inflow Design Flood. He has also been involved in flood risk management studies as both project manager and hydrology and hydraulic engineer. As the hydraulic engineer for the flood study of the Whiteface River in northeastern Minnesota, he evaluated the potential to reduce downstream flooding through adjustments to the present summer target water surface elevation and the adaptive management of winter water surface elevations of Whiteface Reservoir. The study incorporated the need for flood storage with the need for water storage for power production and the need to maintain water levels suitable for fish habitat and recreational use, along with maintaining the freeboard necessary to prevent dam overtopping. As part of a due diligence study, he developed a reservoir and hydropower operations schedule for a private power producer to maximize revenue generated by managing the timing of discharge down a river reach that contained multiple dams. Mr. Voigt also analyzed the cause for the unexpected continuation of flooding downstream of two newly installed flood control dams and assessed the potential impact, effectiveness, and risk of a proposed flood control dam. In 2001, he was project manager for the data collection program that was undertaken to ascertain substrate and vegetation characteristics at approximately 80 locations on 10 river reaches in Northern Minnesota as part of the Mississippi River Reservoir Operating Plan Evaluation Study.

Mr. Voigt is familiar with USACE application of risk analysis for dam safety investigations. He was an active participant in the Potential Failure Mode Assessment (PFMA) for the Lower St. Anthony Falls Hydroelectric Project, and he recently served as the facilitator for a Supplemental PFMA of the design of repair alternatives to the Brainerd Dam. He also attended the first and second phases of Risk Informed Decision-Making training conducted by the Federal Energy Regulatory Commission, in December 2012 and March 2014. More recently, he was selected as the hydrology and hydraulic engineer on the IEPR panel to review the Supplemental Major Rehabilitation Evaluation Report for Center Hill Dam, Caney Fork River, DeKalb County, Tennessee. He was also selected to participate in the IEPR panel to review the USACE Cattaraugus Creek Watershed Ecosystem Restoration at Springville Dam, Cattaraugus Creek, New York.

Name	Barry Vittor, Ph.D.
Role	Biological Resources and Environmental Law Compliance Expert
Affiliation	Barry A. Vittor & Associates, Inc.

Dr. Vittor is President and Senior Scientist at Vittor & Associates, with more than 40 years of experience in water resource planning and projects, including port development, beach renourishment, and dune and barrier island reconstruction. He earned his Ph.D. in ecology from the University of Oregon. As Director of the Alabama Coastal Foundation and a member of the Mobile Bay National Estuary Program Management Committee, he has been very active in coastal resource management.

For more than 40 years, Dr. Vittor has conducted National Environmental Policy Act (NEPA) impact assessments for USACE, USEPA, and other public sector and private clients. He has conducted wetlands delineation, restoration and management, and threatened/endangered species evaluations, and has assisted in regulatory agency permitting of hundreds of public and private projects throughout the Southeast. He has prepared EISs and Environmental Assessments (EAs) for government agency and private clients for port developments, beach renourishment, utility installations, aquatic weed control programs, and hurricane-related debris clean-up. Examples include the Peckman River Basin (New Jersey) flood control and ecosystem restoration feasibility study and the programmatic EIS for New York District navigation projects in Port of New York/New Jersey.

Dr. Vittor is experienced in coastal storm risk management projects, particularly in urbanized coastal areas. He has been involved in environmental assessments related to barrier island reconstruction after Hurricane Katrina; studies of port development impacts on wave run-up during major storm events; and USACE IEPRs for Hereford Inlet to Cape May Inlet, New Jersey, Hurricane and Coastal Storm Damage Risk Reduction Project Draft Feasibility Report and Environmental Assessment Statement, and the Surf City and North Topsail Beach Integrated Feasibility Report and Environmental Impact Statement. He is familiar with the habitat and the fish and wildlife species that may be affected by project alternatives in a study area. He has studied ecosystems along the entire U.S. Atlantic coast regarding fisheries, benthic and demersal fauna, avifauna, and other biological resources, in association with assessments of beach renourishment/sand borrow projects and port and navigation development projects.

Dr. Vittor has extensive experience in most aspects of the Clean Water Act (CWA) of 1972, including Section 404 wetlands and streams, National Pollutant Discharge Elimination System discharge permit monitoring, ocean disposal of dredged material, and Section 408 Federal projects coordination. Section 404 permitting often triggers comments from the U.S. Fish & Wildlife Service (USFWS); the Fish and Wildlife Coordination Act provides the Service with comment authority on wetland/stream permit

applications, under Section 7. Dr. Vittor has handled hundreds of such projects, as well as Section 10 coordination with the Service where Federal permits are not involved. He has also prepared Habitat Conservation Plans for a number of protected species. Dr. Vittor is familiar with the Habitat Evaluation Procedure (HEP) of the USFWS, and has applied HEP and several other habitat functional value indices (e.g., Cover Type, Hydrogeomorphic Approach, Wetland Evaluation Technique, Wetland Rapid Assessment Procedure) to field assessments of port development projects along the Gulf Coast, navigation channel maintenance dredging/disposal in riverine and embayment projects in the New York District, and numerous private development projects. He has conducted numerous studies and surveys of plants and animal species listed under the Endangered Species Act (ESA) for a wide variety of public and private client projects, in the Gulf of Mexico and along the Eastern Seaboard. He has prepared Biological Assessments for terrestrial and aquatic species in accordance with USFWS guidelines and has addressed protected species of plants and animals in reviews of coastal beach and dune reconstruction projects on the U.S. Atlantic coast. He has assessed essential fish habitat (EFH) impacts related to beach renourishment, sand borrow operations, petroleum development, and port/navigation projects along the U.S. Atlantic and Gulf coasts, and he has evaluated EFH impacts of storm debris removal operations in the northern Gulf of Mexico.

Dr. Vittor is familiar with the Marine Mammals Protection Act and has assessed potential impacts of offshore oil and gas developments on marine mammals in the Gulf of Mexico, including noise effects, ship collisions, and seismic surveys. He has also participated in peer reviews of impacts of coastal dune and beach reconstruction on marine mammals along the U.S. Atlantic coast and has coordinated with the National Marine Fisheries Service regarding potential impacts of storm debris clean-up operations on marine mammals (especially bottlenose dolphin) in the northern Gulf.

Dr. Vittor has served on several USACE IEPR panels as a biology, ecology, and NEPA specialist for coastal storm damage reduction, flood risk management, deep draft navigation, and ecosystem restoration studies.

APPENDIX C

Final Charge for the Willamette Basin Review IEPR

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Charge Questions and Guidance to the Panel Members for the Independent External Peer Review (IEPR) of the Willamette River Basin Review Reallocation Study, Integrated Feasibility Report and Environmental Assessment

This is the final Charge to the Panel for the Willamette Basin Review IEPR. This final Charge was submitted to USACE as part of the final Work Plan, originally submitted on December 22, 2017.

BACKGROUND

The U.S. Army Corps of Engineers (USACE) operates a system of 13 dams and reservoirs (collectively the Willamette Valley Project) in Oregon's Willamette River basin that provides many benefits to the region and nation. The Willamette Valley Project was authorized by the Flood Control Acts of 1938, 1950, and 1960. The 1938 Act led to the construction of Fern Ridge, Dorena, Cottage Grove, Detroit and Lookout Point dams.

The 1950 Act greatly expanded the Willamette Project both in the number of projects and the scope, with the Willamette River basin the subject of Volume 5 of the eight-volume Columbia River Basin-wide authorization document (House Document 531). The 1950 Act reauthorized the earlier dams, including Green Peter that had not been started, and added the following dams: Big Cliff Dam on the North Santiam River, Cougar and Blue River dams on the McKenzie River, Hills Creek and Dexter dams on the Middle Fork Willamette River, and Falls Creek Dam on Fall Creek.

The primary planned accomplishment of the projects was to provide flood control. Secondary accomplishments were generation of hydroelectric power, main stem navigation, increased water supplies for irrigation and domestic use, increased low-water flows for improved conditions including fish life, and improved recreational conditions at reservoirs and downstream points.

OBJECTIVES

The objective of this work is to conduct an independent external peer review (IEPR) of the Willamette River Basin Review Reallocation Study, Integrated Feasibility Report and Environmental Assessment (hereinafter: Willamette Basin Review IEPR) in accordance with the Department of the Army, USACE, Water Resources Policies and Authorities' *Civil Works Review* (Engineer Circular [EC] 1165-2-214, dated December 15, 2012), and the Office of Management and Budget's *Final Information Quality Bulletin for Peer Review* (December 16, 2004). Peer review is one of the important procedures used to ensure that the quality of published information meets the standards of the scientific and technical community. Peer review typically evaluates the clarity of hypotheses, validity of the research design, quality of data collection procedures, robustness of the methods employed, appropriateness of the methods for the hypotheses being tested, extent to which the conclusions follow from the analysis, and strengths and limitations of the overall product.

The purpose of the IEPR is to assess the "adequacy and acceptability of the economic, engineering, and environmental methods, models, and analyses used" (EC 1165-2-214; p. D-4) for the decision documents. The IEPR will be limited to technical review and will not involve policy review. The IEPR will be conducted by subject matter experts (i.e., IEPR panel members) who meet the technical criteria and areas of expertise required for and relevant to the project.

The Panel will be "charged" with responding to specific technical questions as well as providing a broad technical evaluation of the overall project. Per EC 1165-2-214, Appendix D, review panels should identify, explain, and comment upon assumptions that underlie all the analyses, as well as evaluate the

soundness of models, surveys, investigations, and methods. Review panels should be able to evaluate whether the interpretations of analysis and the conclusions based on analysis are reasonable. Reviews should focus on assumptions, data, methods, and models. The panel members may offer their opinions as to whether there are sufficient analyses upon which to base a recommendation.

DOCUMENTS PROVIDED

Table D-1 contains a list of documents and supporting information that will be provided for the review. The review assignments per panel member may vary slightly according to discipline.

Table D-1. Documents to Be Reviewed by Subject Matter Experts

Review Documents	Subject Experts			
	No. of Review Pages	Civil Works Planner/Economics	Hydrologist/Water Resources Engineer	Biological Resources and Environmental Law Compliance Specialist
Willamette Basin Review Feasibility Study Integrated Feasibility Report and Environmental Assessment	172	172	172	172
Appendix A: M&I Demand and Supply Analysis	73	73		
Appendix B: Agricultural Irrigation Demand Analysis	102	102		
Appendix C: Calculation of Water Volumes Required to Meet Willamette BiOp Minimum Flows for April through October	177		177	
Appendix K: Discussion of Climate Change Impact on Future Regulation	22	22	22	22
Total Number of Review Pages	546	369	371	194
Supplemental Information				
Appendix D: Flow Dataset Used for ResSim Analyses*	32		32	
Appendix E – ResSim Analysis for 2008 Baseline Flow Dataset*	135		135	
Appendix F: ResSim WVP Releases and Live Flow Diversions for Base Year 2020, No Action Alternative, and TSP Model Runs*	37		37	
Appendix G: ResSim Analysis for Base Year 2020, No Action Alternative 2050, and Tentatively Selected Plan 2050*	170		170	
Appendix H: BiOp Flow Objective Performance of the No Action Alternative and Tentatively Selected Plan Under Expected and Peak Demand Conditions*	67	67		
Appendix I: Reservoir-Related Boating Recreation Benefits Impact Analyses*	18	18		
Appendix J: Hydropower Impacts Analysis*	10	10		
Public Comments**	100	100	100	100
Total Number of Reference Pages	569	195	474	100

* Supporting documentation only. These documents are not for Panel review and should be used as information sources only. They are not included in the total page count.

** Page count for public comments is approximate. USACE will submit public comments to Battelle. Battelle will in turn submit the comments to the IEPR Panel.

Documents for Reference

- USACE guidance *Civil Works Review*, (EC 1165-2-214, December 15, 2012)
- Office of Management and Budget’s *Final Information Quality Bulletin for Peer Review* (December 16, 2004)
- Foundations of SMART Planning
- SMART Planning Bulletin (PB 2013-03)
- SMART – Planning Overview
- Planning Modernization Fact Sheet.

SCHEDULE & DELIVERABLES

Table D-2 is the schedule is based on the receipt date of the final review documents. This schedule may also change due to circumstances out of Battelle’s control such as changes to USACE’s project schedule and unforeseen changes to panel member and USACE availability. As part of each task, the panel member will prepare deliverables by the dates indicated in the table (or as directed by Battelle). All deliverables will be submitted in an electronic format compatible with MS Word (Office 2003).

Table D-2. IEPR Milestones and Deliverables

Task	Action	Due Date
Attend Meetings and Begin Peer Review	Subcontractors complete mandatory Operations Security (OPSEC) training	1/21/2018
	Battelle sends review documents to panel members	12/28/2017
	Battelle convenes kick-off meeting with panel members	12/28/2017
	Battelle convenes kick-off meeting with USACE and panel members	12/28/2017
	Battelle convenes mid-review teleconference for panel members to ask clarifying questions of USACE	1/11/2018

Table D-2. IEPR Milestones and Deliverables (continued)

Task	Action	Due Date
Prepare Final Panel Comments and Review Public Comments	Panel members complete their individual reviews	1/24/2018
	Battelle provides talking points for Panel Review Teleconference to panel members	1/26/2018
	Battelle convenes Panel Review Teleconference	1/29/2018
	Battelle provides Final Panel Comment templates and instructions to panel members	1/30/2018
	Panel members provide draft Final Panel Comments to Battelle	2/5/2018
	Battelle provides feedback to panel members on draft Final Panel Comments; panel members revise Final Panel Comments	2/06/2018 - 2/12/2018
	Panel finalizes Final Panel Comments	2/13/2018
	Battelle receives public comments from USACE	12/29/2017
	**Battelle sends public comments to Panel	1/24/2018
	Panel completes its review of public comments	1/29/2018
	Battelle and Panel review Panel's responses to public comments	1/30/2018
	Panel drafts Final Panel Comment for public comments, if necessary	2/8/2018
	Panel finalizes Final Panel Comment regarding public comments, if necessary	2/12/2018
Review Final IEPR Report and Addendum	Battelle provides Final IEPR Report to panel members for review	2/14/2018
	Panel members provide comments on Final IEPR Report	2/16/2018
	*Battelle submits Final IEPR Report to USACE	2/21/2018
	USACE Planning Center of Expertise (PCX) provides decision on Final IEPR Report acceptance	2/28/2018
	Battelle provides Addendum to Final IEPR Report to panel members for review	2/14/2018
	Panel members provide comments on Addendum to Final IEPR Report	2/16/2018
	*Battelle submits Addendum to Final IEPR Report to USACE	2/27/2018
	USACE Planning Center of Expertise (PCX) provides decision on Addendum to Final IEPR Report acceptance	3/6/2018

Table D-2. IEPR Milestones and Deliverables (continued)

Task	Action	Due Date
Comment-Response Process	Battelle inputs Final Panel Comments to Design Review and Checking System (DrChecks) and provides Final Panel Comment response template to USACE	3/6/2018
	Battelle convenes teleconference with Panel to review the Comment Response process	3/6/2018
	USACE Project Delivery Team (PDT) provides draft Evaluator Responses to USACE PCX for review	3/20/2018
	USACE PCX reviews draft Evaluator Responses and works with USACE PDT regarding clarifications to responses, if needed	3/26/2018
	USACE PCX provides draft PDT Evaluator Responses to Battelle	3/27/2018
	Battelle provides draft PDT Evaluator Responses to panel members	3/29/2018
	Panel members provide draft BackCheck Responses to Battelle	4/3/2018
	Battelle convenes teleconference with panel members to discuss draft BackCheck Responses	4/4/2018
	Battelle convenes Comment Response Teleconference with panel members and USACE	4/5/2018
	USACE inputs final PDT Evaluator Responses to DrChecks	4/12/2018
	Battelle provides final PDT Evaluator Responses to panel members	4/13/2018
	Panel members provide final BackCheck Responses to Battelle	4/18/2018
	Battelle inputs panel members' final BackCheck Responses to DrChecks	4/19/2018
	*Battelle submits pdf printout of DrChecks project file	4/20/2018
SLM 1	Senior Leader Meeting (SLM) 1 - Agency Decision Milestone (ADM) Meeting	3/2/2018
SLM 2	Senior Leader Meeting 2 – Post-ADM	5/30/2018
	Contract End/Delivery Date	10/30/2018

* Deliverables

** Battelle will provide public comments to the Panel after they have completed their individual reviews of the project documents to ensure that the public comment review does not bias the Panel's review of the project documents.

CHARGE FOR PEER REVIEW

Members of this IEPR Panel are asked to determine whether the technical approach and scientific rationale presented in the decision documents are credible and whether the conclusions are valid. The Panel is asked to determine whether the technical work is adequate, competently performed, and properly documented; satisfies established quality requirements; and yields scientifically credible conclusions. The Panel is being asked to provide feedback on the economic, engineering, environmental resources, and plan formulation. The panel members are not being asked whether they would have conducted the work in a similar manner.

Specific questions for the Panel (by report section or appendix) are included in the general charge guidance, which is provided below.

General Charge Guidance

Please answer the scientific and technical questions listed below and conduct a broad overview of the decision documents. Please focus your review on the review materials assigned to your discipline/area of expertise and technical knowledge. Even though there are some sections with no questions associated with them, that does not mean that you cannot comment on them. Please feel free to make any relevant and appropriate comment on any of the sections and appendices you were asked to review. In addition, please note that the Panel will be asked to provide an overall statement related to 2 and 3 below per USACE guidance (EC 1165-2-214; Appendix D).

1. Your response to the charge questions should not be limited to a “yes” or “no.” Please provide complete answers to fully explain your response.
2. Assess the adequacy and acceptability of the economic and environmental assumptions and projections, project evaluation data, and any biological opinions of the project study.
3. Assess the adequacy and acceptability of the economic analyses, environmental analyses, engineering analyses, formulation of alternative plans, methods for integrating risk and uncertainty, and models used in evaluating economic or environmental impacts of the proposed project.
4. If appropriate, offer opinions as to whether there are sufficient analyses upon which to base a recommendation.
5. Identify, explain, and comment upon assumptions that underlie all the analyses, as well as evaluate the soundness of models, surveys, investigations, and methods.
6. Evaluate whether the interpretations of analysis and the conclusions based on analysis are reasonable.
7. Please focus the review on assumptions, data, methods, and models.

Please **do not** make recommendations on whether a particular alternative should be implemented, or whether you would have conducted the work in a similar manner. Also please **do not** comment on or make recommendations on policy issues and decision making. Comments should be provided based on your professional judgment, **not** the legality of the document.

1. If desired, panel members can contact one another. However, panel members **should not** contact anyone who is or was involved in the project, prepared the subject documents, or was part of the USACE Agency Technical Review (ATR).
2. Please contact the Battelle Project Manager (Corey Wisneski; wisneskic@battelle.org) or Program Manager (Rachel Sell; sellr@battelle.org) for requests or additional information.
3. In case of media contact, notify the Battelle Program Manager, Rachel Sell (sellr@battelle.org) immediately.
4. Your name will appear as one of the panel members in the peer review. Your comments will be included in the Final IEPR Report but will remain anonymous.

Please submit your comments in electronic form to the Project Manager, wisneskic@battelle.org, no later than 10 pm ET by the date listed in the schedule above.

Independent External Peer Review of the Willamette River Basin Review Reallocation Study, Integrated Feasibility Report and Environmental Assessment

Charge Questions and Relevant Sections as Supplied by USACE

Broad Evaluation Review Charge Questions

1. Are the need for and the intent of the decision document clear?
2. Does the decision document adequately address the stated need and intent relative to scientific and technical issues?

Given the need for and intent of the decision document, assess the adequacy and acceptability of the following:

3. Project evaluation data used in the study analyses
4. Economic, environmental, and water resources assumptions that underlie the study analyses
5. Economic, environmental, and engineering methodologies, analyses, and projections
6. Models used in the evaluation of existing and future without-project conditions and of economic or environmental impacts of alternatives
7. Methods for integrating risk and uncertainty
8. Formulation of alternative plans and the range of alternative plans considered
9. Quality and quantity of the surveys and investigations, and demand forecasts sufficient for conceptual design of alternative plans
10. Overall assessment of significant environmental impacts and any biological analyses.

Further,

11. Evaluate whether the interpretations of analysis and the conclusions based on analysis are reasonable.
12. Assess the considered and tentatively selected alternatives from the perspective of systems, including systemic aspects being considered from a temporal perspective, including the potential effects of climate change.

Battelle Summary Charge Questions to the Panel Members¹

Summary Questions

13. Please identify the most critical concerns (up to five) you have with the project and/or review documents. These concerns can be (but do not need to be) new ideas or issues that have not been raised previously.
14. Please provide positive feedback on the project and/or review documents.

¹ Questions 13 through 15 are Battelle-supplied questions and should not be construed or considered part of the list of USACE-supplied questions. These questions were delineated in a separate appendix in the final Work Plan submitted to USACE.

Public Comment Questions

15. Do the public comments raise any additional discipline-specific technical concerns with regard to the overall report?

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APPENDIX D

Conflict of Interest Form

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Conflicts of Interest Questionnaire
Independent External Peer Review
WILLAMETTE RIVER BASIN REVIEW REALLOCATION STUDY

The purpose of this document is to help the U.S. Army Corps of Engineers identify potential organizational conflicts of interest on a task order basis as early in the acquisition process as possible. Complete the questionnaire with background information and fully disclose relevant potential conflicts of interest. Substantial details are not necessary; USACE will examine additional information if appropriate. Affirmative answers will not disqualify your firm from this or future procurements.

NAME OF FIRM: Battelle Memorial Institute Corporate Operations
REPRESENTATIVE'S NAME: Jason M. Jenkins
TELEPHONE: 614-424-4873
ADDRESS: 505 King Avenue, Columbus, Ohio 43201
EMAIL ADDRESS: jenkinsj@battelle.org

I. INDEPENDENCE FROM WORK PRODUCT. Has your firm been involved in any aspect of the preparation of the subject study report and associated analyses (field studies, report writing, supporting research etc.) **No** **Yes** (if yes, briefly describe):

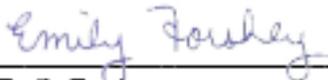
II. INTEREST IN STUDY AREA OR OUTCOME. Does your firm have any interests or holdings in the study area, or any stake in the outcome or recommendations of the study, or any affiliation with the local sponsor? **No** **Yes** (if yes, briefly describe):

III. REVIEWERS. Do you anticipate that all expert reviewers on this task order will be selected from outside your firm? **No** **Yes** (if no, briefly describe the difficulty in identifying outside reviewers):

IV. AFFILIATION WITH PARTIES THAT MAY BE INVOLVED WITH PROJECT IMPLEMENTATION. Do you anticipate that your firm will have any association with parties that may be involved with or benefit from future activities associated with this study, such as project construction? **No** **Yes** (if yes, briefly describe):

V. ADDITIONAL INFORMATION. Report relevant aspects of your firm's background or present circumstances not addressed above that might reasonably be construed by others as affecting your firm's judgment. Please include any information that may reasonably: impair your firm's objectivity; skew the competition in favor of your firm; or allow your firm unequal access to nonpublic information.

No additional information to report.



Emily Forshey

October 31, 2017

Date

BATTELLE

It can be done