REVIEW PLAN
Willamette Valley System Programmatic EIS
Revision 2
August 2023

Project Name: Willamette Valley System Operations and Maintenance Programmatic EIS and ESA Consultation

P2 Number: Multiple (474050, 474052, 474054, 474055, 474058, 474059, 474060, 474061, 474062, 474063)

Decision Document Type: EIS Record of Decision

Project Type: Operational system of 13 dams, reservoirs, revetments and related facilities authorized for multiple purposes.

District: Portland District
District Contact: Kelly Wingard, Project Manager, 503-808-4240

Major Subordinate Command (MSC): Northwestern Division
MSC Contact: Carrie Bond, Environmental Planner, 503-808-3863

Review Management Organization (RMO): Northwestern Division
RMO Contact: Carrie Bond, Environmental Planner, 503-808-3863

Key Review Plan Dates

Date of RMO Endorsement of Review Plan: April 21, 2022
Date of MSC Approval of Review Plan: April 21, 2022
Date of IEPR Exclusion Approval: NA
Has the Review Plan changed since PCX Endorsement? N/A
Date of Last Review Plan Revision: August 21,2023
Date of Review Plan Web Posting: August 2023
Date of Congressional Notifications: None

Milestone Schedule

	Scheduled	Actual	Complete
Range of Alternatives*:	Nov 2019	Nov 2019	Yes
Preferred Alternative*:	Feb 2022	May 2022	Yes
Publish Draft EIS:	Nov 2022	Nov 2022	Yes

Draft Biological Assessment*:	Nov 2022	Nov 2022	Yes
Draft Biological Opinion*:	Nov 2023		No
Final Biological Opinion	Apr 2024		No
Publish Final EIS*:	Feb 2025		No
Record of Decision:	Mar 2025		No

* indicates that a District and NWD in-progress review will occur at the milestone.

Project Fact Sheet
April 2022

Project Name: Willamette Valley System (WVS) Operations and Maintenance Programmatic EIS

Location: Willamette River Basin, Oregon

Authority: The WVS was authorized via multiple flood control acts; Operations and Maintenance and ESA are the drivers for the EIS.

Sponsor: Not applicable

Type of Study: Environmental Impact Statement and ESA Consultation

SMART Planning Status: Not a SMART Planning study

Project Area: Willamette River Basin, Oregon

Problem Statement: The purpose and need statement for the EIS is as follows:

> "The purpose and need is continued operations and maintenance of the Willamette Valley System (WVS) in accordance with authorized project purposes; while meeting Endangered Species Act (ESA) obligations to avoid jeopardizing the continued existence of listed species."

The most recent NEPA evaluation for the overall WVS operations and maintenance was an environmental impact statement completed in 1980. Since that time, operations have been modified and structural improvements for fish passage and temperature control have been implemented to address effects of the WVS on ESA-listed fish. There is also new information relevant to the environmental impacts of operating the WVS. Collectively these changes result in a need for a new evaluation of possible operations and implementation of actions to meet authorized project purposes, protect life safety, and ESA obligations. On April 9, 2018, the Corps reinitiated formal consultation under Section 7 of the ESA on the National Marine Fisheries Service's 2008 Biological Opinion (2008 BiOp) for the Willamette River Basin Flood Control Project. The 2008 BiOp "expires" in 2023. The NEPA process will inform the ESA Section 7 consultation process.

Authorized project purposes for the WVS are: Flood Control, Hydropower, Water Supply, Irrigation, Fish and Wildlife, Water Quality, Recreation, and Navigation. Authorized purposes vary by dam.

The EIS will evaluate a no action alternative and action alternatives. The no action alternative is the current management direction for the WVS as of November 2020. Action alternatives will be composed of various measures for continued operations and maintenance of the WVS, as well as

measures that will be developed to meet ESA obligations to avoid jeopardizing the continued existence of listed species.

Federal Interest: The Corps operates and maintains the WVS, which consists of 13 multipurpose dams and reservoirs, and associated fish passage facilities and a fish hatchery program, on tributaries of the Willamette River (North Santiam River, South Santiam River, McKenzie River, Middle Fork of the Willamette, Coast Fork of the Willamette, Row River, and Long Tom River). The USACE Willamette Valley dams are operated as a system to provide flood risk management along with achieving other authorized purposes. These dams have authorized purposes that are exclusive to each dam but the collective operation of these dams are as a system; modifications that may result from this EIS need to consider the collective system impacts. The system also includes various bank protection projects along these and other tributaries as well as the mainstem of the Willamette River, for some of which the Corps has continued O&M responsibilities.

Risk Identification:

Litigation – NEDC v. USACE is ongoing litigation over the timing of the implementation of the 2008 BiOp. Outcome of the litigation may affect scope and schedule, or require specific analytical requirements or alternatives. Given that operation and maintenance of the Willamette Valley System is already the subject of litigation, there is high likelihood these parties could challenge the new EIS and BiOp. Also, the proposed alternatives include measures that could have considerable impacts on the system's authorized purposes, likely motivating other parties to challenge this effort. However, the Corps is working on a detailed adaptive management and implementation plan that would provide interim operations until larger solutions could be implemented. These actions will hopefully prevent Court ordered injunctive relief until the ongoing case is resolved.

Public Concern/Controversy - Competing interests in the Willamette Valley and potential controversy over alternatives presented in the Draft EIS may result in the need to further refine/revise alternatives to respond to comments or delays if comments require extensive review and response. There is considerable congressional interest in the project, and it has high visibility with a number of stakeholders.

Prolonged ESA Consultation - Project schedule is based on completing ESA consultation and including results in the Final EIS and ROD. Prolonged ESA consultation/negotiation would jeopardize schedule and delay implementation of actions needed to meet ESA obligations. Additionally, a jeopardy determination may result in the need to revise the Draft EIS and conduct an additional public comment period.

Implementation/Technical Feasibility Risks - Management measures that would require additional authorities may require additional reviews, studies and supplemental NEPA analysis. Implementation of certain measures would require appropriations from Congress for a study and a new start authorization. Approval for change in authorities is uncertain.

Flood Risk Management - The PDT has identified maintenance of existing levels of flood risk reduction as a constraint in the development of alternatives. Measures will be carefully screened using pre-work of modeling with Res-Sim to evaluate changes to flood risk management levels in comparison to the No Action Alternative.

Dam Safety - Coordination with the dam safety subject matter experts is essential for screening or modifying measures proposed in this EIS for dam safety impacts. Impacts to dam safety will be estimated qualitatively with the principles of "Life Safety is Paramount" and "Do No Harm." The USACE Tolerable Risk Guidelines, as outlined in Planning Bulletin 2019-04, will be considered for this EIS. Dam Safety risks associated with the Willamette Valley dams range from low to high. The USACE dam safety program is continuously assessing risks through its routine and advanced risk assessment processes. Advanced risk assessments (Issue Evaluation Studies) for the highest risk WVP dams began in 2014 and are expected to continue beyond 2025. If risks are found to be high enough to warrant long-term risk reduction actions, Dam Safety Modification Studies (DSMS) will be performed to study long-term measures. Long-term risk reduction measures studied in DSMS include structural measures, operational changes, and non-structural measures, among others. Interim Risk Reduction Measures (IRRMs), including reservoir operating restrictions, are currently in place to reduce life safety risks while issues are studied further and until long-term risk reduction measures are implemented, as required. IRRM Plans are regularly reviewed and updated as USACE learns more about the risks associated with the dams, and additional measures may be implemented in the future. Depending on their nature, IRRMs may need NEPA analysis to be completed for individual actions. DSMS include NEPA analysis as part of the studies.

The Willamette River Basin

1. FACTORS AFFECTING THE LEVELS OF REVIEW

Scope of Review.

- Will the study likely be challenging? Yes. This is a complex system of 13 dams involving multiple different outputs for which there will likely be tradeoffs when considering operational alternatives. There are many different stakeholder groups representing the public interests in the WVS that are expected to be vocal regarding future operational decisions. Ongoing litigation adds additional complexity.

- Provide a preliminary assessment of where the project risks are likely to occur and assess the magnitude of those risks: (see paragraphs above for a detailed description of the areas of risk)

    - Litigation: Risk= High, Likelihood= High, Impact= Significant. The subject of this EIS is already under litigation. The plaintiffs in the current case will likely challenge this project as well.

    - Public Concern/Controversy: Risk= High, Likelihood= High, Impact= Moderate. Impact to schedule may occur, but this is a typical and anticipated occurrence for an EIS of this complexity.

    - Prolonged ESA Consultation: Risk= High, Likelihood= High, Impact= Significant. A jeopardy determination that includes actions not included in the proposed action and not previously analyzed in the EIS may require a revised Draft EIS and additional reviews. The PDT is working closely with resource agencies to mitigate this risk.

    - Implementation/Technical Feasibility: Risk= Moderate, Likelihood= Unknown, Impact=Significant. The EIS may consider alternatives with management measures that are outside current authorities for operating the projects. The PDT is working to mitigate this risk by applying screening criteria that would screen out any measure that may impact operations related to a project purpose but would not completely eliminate the Corps' ability to meet an authorized project purpose. Implementation of an alternative requiring a change in operating authorities is a possibility. If authorization to conduct studies seeking to change authorities is not received, new consultation and additional NEPA analysis may be necessary.

    - Flood Risk Management: Measures that would impact flood risk management levels will be screened out.

    - Dam Safety: The PDT will carefully coordinate with Dam Safety subject matter experts to mitigate any risks.

- Is the project likely to be justified by life safety or is the study or project likely to involve significant life safety issues? No. Dam safety review will be done for each of the proposed measures, and measures will be screened for significant life safety issues

following the principles that "Life Safety is Paramont" and "Do No Harm." Flood risk management is a constraint, and no alternatives will be considered that reduce the flood risk management operations of the dams.

- Has the Governor of an affected state requested a peer review by independent experts? No.

- Will the EIS likely involve significant public dispute as to the project's size, nature, or effects? Yes, particularly around ESA obligations and their potential implications on operation of the WVS for other authorized purposes.

- Is the project/study likely to involve significant public dispute as to the economic or environmental cost or benefit of the project? Yes. See above.

- Is the information in the decision document or anticipated project design likely to be based on novel methods, involve innovative materials or techniques, present complex challenges for interpretation, contain precedent-setting methods or models, or present conclusions that are likely to change prevailing practices? No. The project is using ResSim to assess the hydrologic changes from the alternative operations scenario. The ResSim model is a Corps approved model and will be reviewed through a targeted ATR process. Water quality models will also go through an early targeted ATR. Biological tools will be verified similarly to the process that has been used for the Columbia River BiOp actions for years. Biological tools will undergo independent technical assessment. Consistent with the model review plan developed for the 2015 Willamette Continued Operation Plan (COP), biological tools will go through review using the Independent Science Advisory Board (ISAB) associated with the Northwest Power and Conservation Council. The rationale for this approach, rather than through the PCX, is that the existing ISAB review panel includes the necessary expertise. Some mmanagement measures being evaluated have been proposed or evaluated through other studies, such as the 2015 Willamette COP and Operational Measures Evaluation Team (OMET) studies.

- Does the project design require redundancy, resiliency, and/or robustness, unique construction sequencing, or a reduced or overlapping design/construction schedule? Yes. This EIS includes structures that would require complex sequencing and detailed design efforts during implementation. One structure, the Detroit FSS/SWS has already gone through a detailed design process.

- Is the estimated total cost of the project greater than $200 million? Yes. The EIS is programmatic, and operational and structural measures are being evaluated for fish passage. It is uncertain what the final suite of measures would be in the proposed action. The only new infrastructure being evaluated would be that required to meet ESA obligations. Any new infrastructure needed for ESA obligations would be evaluated programmatically, with subsequent planning and design efforts, including supplemental NEPA review. Current cost estimates range from $400M - $2.3B.

- Will an Environmental Impact Statement be prepared as part of the study? Yes.

- Is the project expected to have more than negligible adverse impacts on scarce or unique tribal, cultural, or historic resources? Uncertain. Cultural resources and management of cultural resources has been consistently raised as an issue by the Tribes. In addition to the ESA-listed species that are culturally important, another tribal resource is lamprey, which reservoir operations affect. Impacts to lamprey should be carefully considered in the study.

- Is the project expected to have substantial adverse impacts on fish and wildlife species and their habitat prior to the implementation of mitigation measures? Yes. In a 2008 Biological Opinion, NMFS and USFWS determined that continued operation of the WVS would jeopardize the continued existence of multiple listed fish species and destroy or adversely modify their designated critical habitat and included a number of conservation measures and Reasonable and Prudent Alternatives (RPA) for the Corps to implement to avoid jeopardizing continued existence of the species. The Corps is currently being litigated regarding implementation of the RPA. The purpose of this EIS is to reevaluate system operations and related measures with the goal of avoiding jeopardy.

- Is the project expected to have, before mitigation measures, more than a negligible adverse impact on an endangered or threatened species or their designated critical habitat? See above.

2. REVIEW EXECUTION PLAN

This section describes each level of review to be conducted. Based upon the factors discussed in Section 1, this study will undergo the following types of reviews in accordance with the references listed below:

References

- NWD Regulation 1110-1-3, "Modifications at Existing Corps Owned Civil Works Projects"
- ER 1110-2-1156, "Safety of Dams Policy and Procedures"
- ER 1165-2-217, "Civil Works Review Policy"
- PB 2019-04, "Incorporating Life Safety into Flood and Coastal Storm Risk Management Studies"
- Commander's Policy Memorandum #NWD 38, Endangered Species Act
- Engineering and Construction Division Work Instruction (WI) 104 – District Quality Control Reviews.

District Quality Control. The draft and final EIS (with appendices) and draft Biological Assessment will undergo DQC. We will also plan a targeted DQC for the final EIS after integrating the Biological Opinion on just that new material.

Agency Technical Review. ATR will be performed on the draft and final EIS (including technical reports and technical models) by a qualified team from outside Portland District that is not involved in the day-to-day production of the project/product. The ATR team will be

comprised of certified USACE personnel. The ATR team lead will be from outside of NWD. ATR will be conducted concurrent with the Public Review period. In addition to the standard ATR, two early targeted ATRs of models will be conducted, as noted below under Model Review. We will also plan an ATR of the Preliminary Final EIS and a targeted ATR for the final EIS after integrating the Biological Opinion on just that new material. The rationale for the two-step Final EIS ATR is to allow for the shortest period of time between Final Biological Opinions and Record of Decisions. The material for the targeted ATR for the final EIS after integrating the Biological Opinion will be clearly demarked in the document.

Independent External Peer Review. Based on the Factors described in Section 1, and on the risk-informed analysis described in Section 2.c, IEPR is planned for the project. This is the most independent level of review and is applied in cases that meet criteria where the risk and magnitude of the project are such that a critical examination by a qualified team outside of USACE is warranted. IEPR will be conducted on the draft EIS. IEPR will be conducted concurrent with the Public Review period.

Cost Engineering Review. If necessary, all decision documents shall be coordinated with the Cost Engineering Center of Expertise (MCX). The MCX will assist in determining the expertise needed on the ATR and IEPR teams. The MCX will provide the Cost Engineering certification, if necessary. The RMO is responsible for coordinating with the MCX for the reviews. If needed, these reviews will occur as part of ATR.

Model Review and Approval/Certification. EC 1105-2-412 mandates the use of certified or approved models for all planning work to ensure the models are technically and theoretically sound, compliant with USACE policy, computationally accurate, and based on reasonable assumptions.

Approved Corps tools will be documented as part of the ATR process. Biological tools will be verified similar to the process that has been used for the Columbia River BiOp actions for years. Biological tools will undergo independent technical assessment. Consistent with the model review plan developed for the 2015 Willamette COP, biological tools will go through review using the Independent Science Advisory Board (ISAB) associated with the Northwest Power and Conservation Council. The rationale for this approach, rather than go through the PCX, is that the existing ISAB review panel includes the necessary expertise.

Background on the Independent Science Advisory Board/Independent Science Review Board: In 1998 U.S. Congress Senate-House conference report for the fiscal year 1999 Energy and Water Development Appropriations bill, identified the Northwest Power and Conservation Council's (NPCC) Independent Study Review Panel reviews as an appropriate means for the Corps to have completed additional independent assessment of study designs, methods and goals. This is especially critical as the data produced are used to support biological opinions and implementation decisions and/or to demonstrate that performance goals are being met.

Engineering models will be reviewed during the overall ATR process. Two early model-specific reviews will be completed in advance of the overall ATR to ensure key models are valid and

producing valid results. The early reviews will cover the ResSim model and the water temperature model, CE-QUAL-W2.

Policy and Legal Review. The draft and final EIS and draft Biological Assessment documents will be reviewed by CENWD for compliance with law and policy. ER 1105-2-100, Appendix H provides guidance on policy and legal compliance reviews. Commander's Policy Memorandum #NWD 38 provides guidance on review of Biological Assessments. These reviews culminate in determinations that report recommendations and the supporting analyses and coordination efforts comply with law and policy, and therefore warrant approval or further recommendation to higher authority by the Northwestern Division Commander. NWD Policy and Legal review planned for the draft Biological Opinion and draft final Biological Opinion. We will also plan a targeted NWD Policy and Legal review of the Preliminary Final EIS and a the final EIS after integrating the Biological Opinion on just that new material. The rationale for the two-step Final EIS ATR is to allow for the shortest period of time between Final Biological Opinions and Record of Decisions. The material for the targeted ATR for the final EIS after integrating the Biological Opinion will be clearly demarked in the document.

Table 1 provides the schedules and costs for reviews. The specific expertise required for the teams are identified in later subsections covering each review. These subsections also identify requirements, special reporting provisions, and sources of more information.

Table 1: Levels of Review

Product(s) to undergo Review	Review Level	Start Date	End Date	Cost	Complete
Fish Models	Model Review	10/15/2021	04/28/2023	$20,000	Yes
CE-QUAL-W2 Temperature Models	Targeted ATR	11/08/2021	12/17/2021	$20,000	Yes
Draft Technical Reports	District Quality Control	08/01/2022	09/15/2022	$50,000	Yes
Draft EIS	District Quality Control/ NWP Policy and Legal Review	09/21/2022	10/20/2022	$100,000	Yes
Draft EIS	Cooperating Agency Review	09/21/2022	10/20/2022	N/A	Yes
Draft EIS	Agency Technical Review	11/16/2022	06/15/2023	$100,000	No
Draft EIS	NWD Policy and Legal Review	11/16/2022	07/01/2023	N/A	No
Draft EIS	IEPR (Completes after Public Comment ends)	11/04/2022	07/01/2023	$100,000	No
Draft EIS	Public Review	11/30/2022	02/27/2023	N/A	Yes
Draft Biological Assessment	District Quality Control	09/27/2022	10/19/2022	$25,000	Yes

Draft Biological Assessment	NWD Policy and Legal Review	11/18/2022	01/04/2023	$0	Yes
Draft Biological Opinion	NWD Policy and Legal Review	11/09/2023	12/11/2023	$0	No
Draft Final Biological Opinion	NWD Policy and Legal Review	04/15/2024	05/15/2024	$0	No
Final EIS	District Quality Control/NWP Policy and Legal Review	10/10/2023	1/5/2024	$100,000	No
Final EIS	Agency Technical Review	2/5/2024	05/28/2024	$100,000	No
Final EIS	NWD Policy and Legal Review	2/5/2024	05/28/2024	N/A	No
Final EIS	Targeted District Quality Control/NWP Policy and Legal Review	10/1/2024	12/1/2024	$50,000	No
Final EIS	Targeted ATR	10/1/2024	12/1/2024	$50,000	No
Final EIS	Targeted NWD Policy and Legal Review	10/1/2024	12/1/2024	N/A	No
Record of Decision	NWD Policy and Legal Review	11/1/2024	12/1/2024	N/A	No

DISTRICT QUALITY CONTROL

The Portland District will manage DQC and will appoint a DQC Lead to manage the local review (see ER 1165-2-217, section 8.a.1 and with NWP Engineering and Construction Division Work Instruction (WI) 104 – District Quality Control Reviews). The review plan will be updated prior to DQC and identify specific reviewers for the expertise below. Table 2 identifies the anticipated required expertise for the DQC team.

Table 2: Required DQC Expertise

DQC Team Disciplines	Expertise Required
DQC Lead	A senior professional with extensive experience preparing Civil Works decision documents and conducting DQC; may also serve as a reviewer for a specific discipline (such as planning, economics, environmental resources, etc.)
Planning	A senior water resources planner with experience in dam system operations and flood risk management alternatives development.
Economics	Flood Risk Management, Water Supply, Recreation, Hydropower O&M costs
Environmental Compliance	Endangered Species Act- anadromous fish and other Environmental Compliance, Fish and Wildlife, Climate Change, Water Quality, Environmental Justice, Tribal Resources
Fisheries Biologist	Experience in life-cycle analysis for anadromous fish and with fish passage facility design at high head dams, instream flow management, conservation and harvest hatchery operation and management
Cultural Resources	Archaeological and Built Environment
Hydrology	Computer modeling such as RES-SIM; reservoir operations, flow management; experience in climate change assessments
Hydraulic Engineering	Thorough knowledge of open channel dynamics, application of bank protection (revetments), sediment movement, fish passage flow management, and/or computer modeling such as HEC-RAS
Other Engineering – Civil, Structural	Structural - Dam Safety and Maintenance
Water Quality	Experience in water quality modeling and analyzing water quality parameters
Water Management	Experience in annual water management of a complex system of multi-purpose dams and reservoirs
Cost Engineering	A construction engineer with expertise in developing costs for civils works projects
Operations	Operations and maintenance of dams and related fish facilities including passage and hatcheries

Dam Safety	PE with experience with dam safety risk assessments
Real Estate	A Realty Specialist with experience in Acquisition, Management, and Disposal of real estate interests.

Documentation of DQC. Quality Control will be performed continuously throughout the study. DrChecks software will be used to document DQC comments and subsequent resolution. Following the guidance in ER 1165-2-217 (Pg. 19, figure F), specific certification of DQC completion is required at the draft and final report stages. Documentation of DQC will follow the District Quality Manual and the CENWD Quality Management Plan.

Documentation of completed DQC will be provided to the MSC, RMO and ATR Team Leader prior to initiating an ATR. The ATR team will examine DQC records and comment in the ATR report on the adequacy of the DQC effort. Missing or inadequate DQC documentation can result in delays to the start of other reviews (see ER 1165-2-217, section 9).

b. AGENCY TECHNICAL REVIEW

The ATR will assess whether the analyses are technically correct and comply with guidance, and that documents explain the analyses and results in a clear manner. CENWD Planning, Environmental Resources, Fish Policy and Support Division (CENWD-PDD) will act as the Review Management Organization (RMO) for this project. The RMO will manage ATR, including establishing the ATR team. The ATR team members will be certified to perform reviews based on the established lists maintained by the various technical Communities of Practice (see ER 1165-2-217, section 9(h)(1)). Table 3 identifies the disciplines and required expertise for this ATR Team. The Draft EIS ATR comments will be closed out consistent with ER 1165-2-217 section 5.9.1.1 noting that unresolved comments have been elevated to ther RMO for resolution. The incorporation of the Draft EIS ATR comments into the EIS will be verified with the Final EIS ATR.
The Final EIS and Targeted ATR team is reduced as compared to the Draft EIS ATR team, removing the planning discipline. This decision document is not subject to ER-1105-2-100. The majority of comments received from the planning reviewer during the Draft EIS review substantively referred to 40 C.F.R. § 1502 (the NEPA regulation) and the Endangered Species Act that falls under the expertise of the environmental resources discipline expertise and is a duplicative effort. Other comments pertained to application of NED and RED, which do not apply to this decision document. As the Targeted ATR is specific to changes between the Draft and Final EIS as a result of completing ESA consultation, the planning expertise is not required.

Table 3: Required ATR Team Expertise

ATR Team Disciplines	Expertise Required
ATR Lead	A senior professional with extensive experience preparing Civil Works decision documents and conducting ATR; should have the skills to manage a virtual team through an ATR; may serve as a reviewer for a specific discipline (such as planning)

ATR Team Disciplines	Expertise Required
Planning	A senior water resources planner with experience in dam system operations and flood risk management. The reviewer will be certified for ATR by the Plan Formulation Sub-CoP. This review is for the Draft EIS only.
Economics (Hydropower)	Hydropower economics. The reviewer will be certified for ATR by the Economics Sub-CoP.
Economics (Rec/Other)	Flood Risk Management, Water Supply, and Recreation economics. The reviewer will be certified for ATR by the Economics Sub-CoP.
Environmental Resources	Environmental Compliance (specifically NEPA), ESA Listed Species, Fish and Wildlife, Environmental Justice. The reviewer will be certified by the Environmental CoP for ATR of Environmental Compliance.
Fisheries Biologist	Experience in life-cycle analysis for anadromous fish and with fish passage facility design at high head dams, instream flow management, conservation and harvest hatchery operation and management.
Cultural / Tribal Resources	Archaeological and Built Environment and Tribal Resources. The reviewer will be certified for ATR by the Cultural Resources CoP.
Hydrology	Computer modeling, specifically RES-SIM; reservoir operations, flow management and climate change assessments. The reviewer will be listed in CERCAP as certified for ATR by the HH&C CoP. Can be combined with Water Management discipline.
Water Management	Experience in annual water management of a complex system of multi-purpose dams and reservoirs. Can be combined with Hydrology discipline.
Hydraulic Engineering	Thorough knowledge of open channel dynamics, application of bank protection (revetments), sediment movement, fish passage flow management, and/or computer modeling. The reviewer will be listed in CERCAP as certified for ATR by the HH&C CoP.
Dam Safety	P.E. with experience with dam safety risk assessments; Dam Safety reviewer(s) should be coordinated with the USACE Dam Safety Modification Center of Expertise (POC John Clarkson). Can be combined with Other Engineering discipline.
Other Engineering – Civil, Structural	Structural - with P.E. and Dam Safety, Risk Assessment, and Maintenance experience. The reviewer will be listed in CERCAP as certified for ATR by the Structural CoP. Can be combined with Dam Safety discipline.
Water Quality	Experience in water quality modeling and analyzing water quality parameters.
Cost Engineering	A construction engineer with expertise in developing costs for Civils Works projects. The reviewer will be on the list of qualified ATR reviewers maintained by the Cost Engineering CX in Walla Walla.

ATR Team Disciplines	Expertise Required
Climate Preparedness and Resilience CoP Reviewer	A member of the Climate Preparedness and Resiliency Community of Practice (CoP) will participate in the ATR review.
Real Estate	A senior subject matter expert with experience in the Planning, Acquisition, Management and Disposal of real estate interests. The reviewer will be certified for ATR by the Real Estate CoP.

Targeted ATR
Advanced agency technical reviews will be conducted for the water temperature model used in the EIS and BA. The water quality model CE-QUAL-W2 is being used to model temperatures as a result of the operations in the alternatives developed for the continued operation and maintenance of the WVS. The temperature results are a key input into fisheries models. The targeted review will verify the model is working for the intended purpose and model results are valid. See attached specific review document entitled "Willamette EIS Project, Water Quality External Review Team".

Documentation of ATR. DrChecks will be used to document all ATR comments, responses, and resolutions. All members of the ATR team will use the four part comment structure (see EC 1165-2-217, Section 9(k) (1)). Comments will be limited to those needed to ensure product adequacy. If a concern cannot be resolved by the ATR team and PDT, it will be elevated to the vertical team for resolution using the ER 1165-2-217 issue resolution process. Concerns can be closed in DrChecks by noting the concern has been elevated for resolution. The ATR Lead will prepare a Statement of Technical Review (see ER 1165-2-217, Section 9) for the draft and final reports, certifying that review issues have been resolved or elevated. ATR may be certified when all concerns are resolved or referred to the vertical team and the ATR documentation is complete.

c. INDEPENDENT EXTERNAL PEER REVIEW

Decision on IEPR. An IEPR will be conducted for this project. This is a risk-informed decision based on information presented in Section 1 on "Factors Affecting the Level of Review". The project does not meet the requirements for mandatory IEPR based on cost threshold (greater than $200M, or for life safety issues) nor has the Governor of Oregon requested IEPR on this project. However, the operation of the system of 13 dams for multiple purposes and involving multiple stakeholders is quite complex. The nature of potential effects of operational alternatives on ESA-listed species and to the different operating purposes leads to potential controversy regarding the analysis of these effects. Ongoing litigation regarding ESA compliance adds additional complexity and risk. For these reasons, IEPR is warranted for this project.

Following guidance in ER 1165-2-217, CENWD (acting as the RMO) will coordinate with an Outside Eligible Organization (OEO) to obtain a qualified IEPR Team. Coordination with the OEO will occur early in the study process to allow adequate time for scoping and contracting the IEPR.

The OEO will manage the IEPR outside of the USACE. The IEPR panel will assess the adequacy and acceptability of the economic and environmental assumptions and projections, project evaluation data, economic analysis, environmental analyses, engineering analyses, formulation of alternative plans, methods for integrating risk and uncertainty, models used in the evaluation of environmental impacts of proposed projects, and biological assessments of the project study.

Products to Undergo IEPR: The draft EIS, including technical appendices.

Required IEPR Panel Expertise. Panels will consist of independent, recognized experts from outside of the USACE in disciplines representing a balance of areas of expertise suitable for the review being conducted. Table 4 lists the required panel expertise.

Table 4: Required IEPR Panel Expertise

IEPR Panel Member Disciplines	Expertise Required
Economics	Flood risk management, hydropower, recreation, water supply, construction, operations and maintenance
Environmental – NEPA Compliance and ESA Compliance	Anadromous ESA-listed species, NEPA compliance, ESA consultation and effects analysis
Engineering – Hydrology	Extensive experience in reservoir operations modeling and climate change
Fish Modeling	The Independent Scientific Advisory Board (ISAB) will be used to satisfy the IEPR requirements for the fish models listed in Table 5

Documentation of IEPR. The OEO will submit a final Review Report no later than 60 days after the end of the draft report public comment period. USACE shall consider all recommendations in the Review Report and prepare a written response for all recommendations. The final decision document will summarize the Review Report and USACE response and will be posted on the internet.

d. SAFETY ASSURANCE REVIEW

The Safety Assurance Review is applied in cases that meet certain criteria where the risk and magnitude of the proposed project are such that a critical examination by a qualified team of experts outside USACE is warranted. A SAR is managed outside of the USACE and is conducted on design and construction for hurricane, storm and flood risk management projects or other projects where existing and potential hazards pose a significant threat to human life. A SAR Panel is typically convened to review the design and construction activities before construction begins and until construction activities are completed, and periodically thereafter on a regular schedule.

Decision on SAR. This is not an implementation document; a SAR will not be conducted.

e. MODEL CERTIFICATION OR APPROVAL

EC 1105-2-412 mandates the use of certified or approved models for all planning activities to ensure the models are technically and theoretically sound, compliant with USACE policy, computationally accurate, and based on reasonable assumptions. Planning models are any models and analytical tools used to define water resources management problems and opportunities, to formulate potential alternatives to address the problems and take advantage of the opportunities, to evaluate potential effects of alternatives and to support decision making. The use of a certified/approved planning model does not constitute technical review of a planning product. The selection and application of the model and the input and output data is the responsibility of the users and is subject to DQC, ATR, and IEPR.

Table 5: Planning Models. The following models may be used to develop the decision document:

Model Name and Version	Brief Model Description and How It Will Be Used in the Study	Certification / Approval
SWIFT- models (OSU and USGS)	Flow and temperature fish survival analysis – evaluate stage and flow in river reaches downstream of dams with estimated ESA-listed anadromous fish survival.	ISAB
Fish Benefit Workbook	Dam passage survival analysis – evaluates effects on ESA listed anadromous fish at Willamette Dams.	ISAB
Ecosystem Diagnostic and Treatment (EDT)	EDT modeling framework allows explicit analysis and prediction of population performance metrics for UWR spring Chinook salmon in the Upper Willamette River Basin for the No Action Alternative and five Action Alternatives. It will be used to inform selection of a Preferred Alternative.	ISAB
Life Cycle Model – University of British Columbia	Quantitative effects analysis for ESA fish and results qualitatively used to evaluate effects on non-ESA fish and aquatic resources.	ISAB
Life Cycle Model – NOAA	Quantitative effects analysis for ESA fish and results qualitatively used to evaluate effects on non-ESA fish and aquatic resources.	ISAB
IWR Planning Suite II, Multi-Criteria Decision Analysis (MCDA) module	The IWR Planning Suite II, including the use of the Multi-Criteria Decision Analysis (MCDA) module, will be used to perform a trade off analysis between the action alternatives under consideration for selection of the preferred alternative.	Approved May 31, 2018

EC 1105-2-412 does not cover engineering models used in planning. The responsible use of well-known and proven USACE developed and commercial engineering software will continue. The professional practice of documenting the application of the software and modeling results will be followed. The USACE Scientific and Engineering Technology Initiative has identified

many engineering models as preferred or acceptable for use in studies. These models should be used when appropriate. The selection and application of the model and the input and output data is still the responsibility of the users and is subject to DQC, ATR, and IEPR.

Table 6: Engineering Models. These models may be used to develop the decision document:

Model Name and Version	Brief Model Description and How It Will Be Used in the Study	Approval Status
HYDSIM	BPA model used to estimate impacts to hydropower outputs across the alternatives.	Not preferred, but allowed for use by NWD (Portland)
CE-QUAL-W2	Used for water quality analysis, temperature and total dissolved gas	H&H CoP Preferred/Allowed
SYS-TDG	This spreadsheet tool is used to estimate TDG levels downstream of the project resulting from the alternatives evaluated in detail.	Not preferred, but allowed for use by NWD (Portland)
HEC-ResSim	The software simulates reservoir operations for flood management, low flow augmentation, and water supply for planning studies, detailed reservoir regulation plan investigations, and real-time decision support. It will be used to simulate system and project operations to evaluate Alternatives. The model uses USGS/USACE flow and elevation data and applies SSAR routing to compute unregulated local flow contributions specified by the user. This model will also be used to extend the unregulated hydrologic dataset between 2008 and 2019, which is input into the HEC-ResSim model.	H&H CoP Preferred

e. POLICY AND LEGAL REVIEW

Policy and legal compliance reviews for draft and final planning decision documents are delegated to Northwestern Division (see Director's Policy Memorandum 2018-05, paragraph 9).

(i) Policy Review.

The policy review team will be identified through the collaboration of the CENWD Chief of Planning and Policy and the HQUSACE Chief of the Office of Water Project Review. The team is identified in Attachment 1 of this Review Plan. The makeup of the Policy Review team will be drawn from Headquarters (HQUSACE), CENWD staff, the Planning Centers of Expertise, and other review resources as needed.

- The Policy Review Team will be invited to participate in key meetings during the development of decision documents. These engagements may include In-Progress Reviews, Issue Resolution Conferences or other vertical team meetings plus the milestone events.

- The input from the Policy Review team should be documented in a Memorandum for the Record (MFR) produced for each engagement with the team. The MFR should be distributed to all meeting participants.

- In addition, teams may choose to capture some of the policy review input in a risk register, if appropriate. These items should be highlighted at future meetings until the issues are resolved. Any key decisions on how to address risk or other considerations should be documented in an MFR.

(ii) Legal Review.

Representatives from the Office of Counsel will be assigned to participate in reviews. Members may participate from the District, CENWD and HQUSACE. The NWD Chief of Planning and Policy will coordinate membership and participation with the office chiefs.

- In some cases legal review input may be captured in the MFR for the particular meeting or milestone. In other cases, a separate legal memorandum may be used to document the input from the Office of Counsel.

- Each participating Office of Counsel representative will determine how to document legal review input.

ATTACHMENT 1: TEAM ROSTERS

PROJECT DELIVERY TEAM		
Name	**Office**	**Position**
Kelly Wingard	CENWP-PPMD	PM
Kathy Warner	CENWP-ENC-HR	Technical Lead / Water Supply
PPPMD		
Kate Hawe	CENWP-PME-E	Environmental Resource Specialist
Emily Barajas	CENWP-PME-E	Contract Coordination
Molly Casperson	CENWP-PME-CR	Cultural Resources
Garrett Dorsey	CENWP-PPMD	Environmental Supervisor, Wildlife Biologist
Omar Ortiz	CENWP-PPMD	District NEPA SME
David Griffith	CENWP-PPMD	District ESA SME
Kelly Janes	CENWP-PM-F	Public Outreach
Dennis Johnson	CENWP-P	Economist, Flood Risk Management
Rachel Laird	CENWP-PME-EF	Fish Biologist, ESA Support
Rich Piaskowski	CENWP-PME-EF	District Fish Biology SME, ESA Support
Tracy Schwartz	CENWP-PME-CR	Cultural Resources
ENC		
Jeff Ballantine	CENWP-ENC-HY	Hydrology
Holly Bellringer	CENWP-ENC-HR	Water Quality
Gregg Bertrand	CENWP-ENC-TG	GIS
Norm Buccola	CENWP-ENC-HR	Water Quality
Keith Duffy	CENWP-ENC-HY	Climate Change Analysis
Salina Hart	CENWP-ENC-HR	Reservoir Operations
Erica Medley	CENWP-ENC-HC	Dam Safety
Chris Nygaard	CENWP-ENC-HY	Sedimentation
Josh Roach	CENWP-ENC-HY	Hydrology - Modeling
Michelle Sanders	CENWP-ENC-HC	Levee Safety - Bank Protection Program
Ryan Souders	CENWP-ENC-DM	Mechanical Engineer
Greg Westling	CENWP-ENC-CC	Cost Engineer
Ryan Woolbright	CENWP-ENC-HD	Fish Benefit Workbook Modeler
HDC		
Margaret Ryan	CENWP-HDC	Hydropower Economist
Willamette Valley		
Greg Taylor	CENWP-OD-V	Fish Biologist
Wendy Jones	CENWP-OD-V	Environmental Stewardship Supervisor
Office of Counsel		

Amanda Lyon	CENWP-OC	Counsel

DISTRICT QUALITY CONTROL TEAM – Draft EIS		
Name	**Office**	**Position**
Kathy Warner	CENWP-ENC-HR	DQC Lead
Ryan Cahill	CENWP-ENC-HY	Hydrology and Hydraulics
Kathryn Tackley	CENWP-ENC-HR	Water Quality
Salina Hart	CENWP-ENC-HR	Water Management
Chanda Littles	CENWP-PME-E	Environmental Compliance – NEPA/EIS
Brad Eppard	CENWP-PME-F	Fish Passage
Katherine Pollock	CENWP-PME-CR	Cultural Resources
Taylor Bolt	CENWO	Economics- Recreation
Chris McCann	CENWP-PM-F	Economics
Jessie Mizic	CENWP-PM-F	Socio-economics
Oliver King	CENWP-RE	Real Estate
Michael Paruszkiewicz	CENWP-HAC	Hydropower
Dustin Bengston	CENWP-ODV	Operations
Wendy Jones	CENWP-ODV	Operations
Wes Messinger	CENWP-ODV	Operations
Kathleen Smith	CENWP-ODV	Operations
Carley Smith	CENWP-ODV	Operations
Greg Taylor	CENWP-ODV	Operations
Doug Garletts	CENWP-ODV	Operations
Todd Pierce	CENWP-ODV	Operations
Chad Helms	CENWP-ODV	Operations
David Crocker	CENWP-ODV	Operations
Steve Gardner	CENWP-ODV	Operations
Tom Voldbaek	CENWP-ODV	Operations
Tim Ernster	CENWP-ODV	Operations
Chris Wren	CENWP-ODV	Operations
Tami Schroeder	CENWP-ODV	Operations

DISTRICT QUALITY CONTROL TEAM – Draft BA		
Name	**Office**	**Position**
Kathy Warner	CENWP-ENC-H	DQC Lead
Michelle Guay	CENWP-PME-E	Environmental Compliance – ESA/BA
Jon Rerecich	CENWP-PME-E	Fish Passage
Ryan Cahill	CENWP-ENC-HY	Hydrology and Hydraulics
Kathryn Tackley	CENWP-ENC-HR	Water Quality
Salina Hart	CENWP-ENC-HR	Water Management
Todd Pierce	CENWP-ODV	Operations

DISTRICT QUALITY CONTROL TEAM – Final EIS		
Name	**Office**	**Position**
Kathy Warner	CENWP-ENC-HR	DQC Lead
Pete Chaput	CENWP-ENC-HY	Chief, Hydrology Section
Ryan Cahill	CENWP-ENC-HY	Hydrology and Hydraulics
Salina Hart	CENWP-ENC-HR	Chief, Water Management Section
Kathryn Tackley	CENWP-ENC-HR	Water Quality
Adam Mamrack	CENWP-ENC-CC	Chief, Cost Engineering
Garrett Dorsey	CENWP-PME-E	Chief, Environmental Resources Section
Michelle Palmer	CENWW	Environmental Compliance – NEPA/EIS
Brad Eppard	CENWP-PME-F	Fish Passage
Katherine Pollock	CENWP-PME-CR	Cultural Resources
Valerie Ringold	CENWP-PM-F	Chief, Planning Branch
Chris McCann	CENWP-PM-F	Economics
Jessie Mizic	CENWP-PM-F	Socio-economics
Amanda Dethman	CENWP-RE	Chief, Real Estate
Oliver King	CENWP-RE	Real Estate
Michael Paruszkiewicz	CENWP-HAC	Hydropower
Dustin Bengston	CENWP-ODV	Operations
Wendy Jones	CENWP-ODV	Operations
Tim Ernster	CENWP-ODV	Operations
Chris Wren	CENWP-ODV	Operations
Tami Schroeder	CENWP-ODV	Operations

AGENCY TECHINCAL REVIEW TEAM – Draft EIS		
Name	**Office**	**Position**
Elliot Stefanik	MVP	ATR Lead
Tina Teed	SPK	Planning
David Sanna	NWP*	Econ - Hydropower
Kelly Baxter-Osborne	NWD	Econ – Rec/Other
Chip Hall	LRN	Environmental
Nancy Gleason	NWS	Fisheries
Tim Meade	NWK	Cultural/Tribal
Alex Flanigan	NWO	Hydrology/Water Management
Zachary Corum	NWS	Hydraulics
Doug Crum	MVP	Dam Safety/Structural
Steve Juul	NWW	Water Quality
Gary Smith	NWW**	Cost Eng
Chanel Mueller	MVP	Climate Change
Craig Homesley	NAB	Real Estate

AGENCY TECHINCAL REVIEW TEAM for WQ Models		
Name	**Office**	**Position**
Elliot Stefanik	CEMVP	ATR Lead
Kathryn Tackley	CENWP-ENC-HR	SME Lead
Stewart Rounds	USGS Emeritus	Water Quality Code Developer
Dan Turner	CENWD-PDW-R	Environmental Engineer - Columbia River Basin Operations and Water Quality
Barry Bunch	CEERD-EPW	Research Civil Engineer - CE-QUAL-W2 Developer
David Gade	CESWF-PEE-T	Limnologist - Water Quality Model Developer

POLICY REVIEW TEAM		
Name	**Office**	**Position**
Carrie Bond	CENWD-PDD	Review Team Lead
Jesse Granet	CENWD-PDD	Environmental Compliance
Tim Fleeger	CENWD-PDD	Planning
Thomas Topi	CENWD-PDD	Economics
Dean Holecek	CENWD-PDD	Tribal Liaison
Mike Flowers	CENWD-PDD	Cultural Resources
Ian Chane	CENWD-PDD	Fisheries Biologist / ESA
William Otero	CENWD-RBT	Hydraulics, Hydrology, Climate Change
Ross Hiner	CENWD-RBT	Dam Safety
Aaron Marshall	CENWD-PDW	Water Management Reservoir Regulation
Christina Austin-Smith / Leanne Holm	CECC-NWD	Office of Counsel
Shawn Worthington	CENWD-PDS	Operations
Enrique Godinez	CENWD-RE	Real Estate