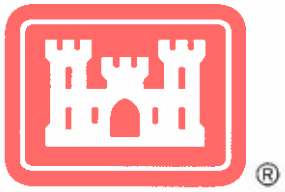

Department of the Army
U.S. Army Corps of Engineers
Washington, DC
7 November 2023

***Engineer Regulation 1105-2-103**

Effective 7 December 2023

CECW-P

Planning
Policy for Conducting Civil Works Planning Studies

FOR THE COMMANDER:

JAMES J. HANDURA
COL, EN
Chief of Staff

Purpose. This regulation provides overall direction by which the U.S. Army Corps of Engineers formulates, evaluates, and recommends projects for implementation and other actions to address water resources problems through the Army Civil Works program. The planning process must address the Nation's water resources needs in a systems context and seek to identify innovative alternatives for application across the full range of the U.S. Army Corps of Engineers programs and authorities. In parallel with the development of these important planning concepts, this regulation is also intended to be useful for those outside of the U.S. Army Corps of Engineers (or non-federal partners) authorized to develop water resources projects (Title 33, Section 2231 of U.S. Code). This regulation will be used as interim guidance until the finalization of the agency specific procedures for U.S. Army Corps of Engineers investment in water resources activities are completed.

Applicability. This regulation applies to all Headquarters U.S. Army Corps of Engineers elements, and all U.S. Army Corps of Engineers commands having Civil Works responsibilities.

Distribution Statement. Approved for public release, distribution is unlimited.

Proponent and Exception Authority. The proponent of this regulation is the Headquarters Civil Works Planning and Policy Division. The proponent has the authority to approve exceptions or waivers to this regulation that are consistent with controlling law and regulations. Only the proponent of a publication or form may modify it by officially revising or rescinding it.

*This regulation supersedes ER 1105-2-100, Chapters 1, 2, and 3, dated 22 April 2000.

Contents (Listed by chapter and page number)

Chapter 1
Introduction

1–1. Purpose
This regulation provides overall direction by which the U.S. Army Corps of Engineers (USACE) formulates, evaluates, and recommends projects for implementation and other actions to address water resources problems through the Army Civil Works program. The planning process must address the Nation's water resources needs in a systems context and seek to identify innovative alternatives for application across the full range of the USACE programs and authorities. In parallel with the development of these important planning concepts, this regulation is also intended to be useful for those outside of the USACE (or non-federal partners) authorized to develop water resources projects (Title 33, Section 2231 of U.S. Code (33 USC 2231)). This regulation will be used as interim guidance until the finalization of the agency specific procedures for U.S. Army Corps of Engineers investment in water resources activities are completed.

1–2. Distribution statement
Approved for public release, distribution is unlimited.

1–3. References
See Appendix A.

1–4. Records management (recordkeeping) requirements
The records management requirement for all record numbers, associated forms, and reports required by this regulation are addressed in the Army Records Retention Schedule – Army (RRS-A). Detailed information for all related record numbers is located in the Army Records Information Management System (ARIMS)/RRS-A at https://www.arims.army.mil. If any record numbers, forms, and reports are not current, addressed, and/or published correctly in ARIMS/RRS-A, see Department of the Army (DA) Pamphlet 25-403, Guide to Recordkeeping in the Army, for guidance.

1–5. Background
The purpose of USACE planning studies and reports is to provide a comparative analysis of alternatives for decision makers and the public, and to provide a basis for Congressional authorization and project implementation.

a. The policies and procedures that govern water resources planning have evolved over many decades, reflecting the needs and values of the Nation.

b. In the 19th century, USACE applied its engineering capabilities to the improvement of navigation for the growing Nation.

c. In the 20th century, Army Civil Works missions broadened to include flood control, hydropower, ecosystem restoration and other services, and the planning for engineered infrastructure began to include consideration of the expected economic, social, and environmental effects.

d. Early in the 21st century, more robust science-based analysis, risk-informed decision-making management and guidelines, climate adaptation policy, resilient

system analysis, and other social effects (OSE) have been emphasized in the formulation and analysis of alternatives.

1–6. Evolution of four Principles and Guidelines accounts

a. The four Principles and Guidelines for Water and Related Land Resources Implementation Studies (P&G) accounts have consistently appeared in federal guidance in some form over the past 90 years; however, their roles and comparative importance have varied greatly. Economic, social, and environmental benefits, impacts, and costs are to be identified, measured, and/or qualitatively characterized using four accounts.

(1) The National Economic Development (NED) account displays changes in the economic value of the national output of goods and services.

(2) The environmental quality (EQ) account displays non-monetary effects on ecological, cultural, and aesthetic resources including the positive and adverse effects of aquatic ecosystem restoration plans.

(3) The Regional Economic Development (RED) account displays changes in the distribution of regional economic activity (for example, income and employment).

(4) The OSE account displays plan effects on social aspects such as community resilience, public health, life safety, displacement, energy conservation, and similar effects.

b. Taken together, the concepts behind the P&G accounts contribute to a structured planning framework for evaluating and comparing alternatives, while also leaving sufficient flexibility to adapt water resource recommendations to federal priorities and the needs of Tribes, partners, stakeholders, and communities.

1–7. The Flood Control Act of 1936

a. The Flood Control Act of 1936 (33 USC 701a) introduced the notion of benefit-cost analysis when it stated that “the Federal Government should improve or participate in the improvement of navigable waters or their tributaries, including watersheds thereof, for flood control purposes if the benefits to whomsoever they may accrue are in excess of the estimated costs, and if the lives and social security of people are otherwise adversely affected.” This general language is notable for its direction that water resources planning decisions would establish the role of the Federal Government based on evaluations of costs, benefits, and public well-being (that is to say, the purpose of projects is to improve people’s lives). Evaluation procedures have continued to develop from the general language of 1936 to the formal analyses in use today.

b. The consideration of benefits and costs was also extended to other water resource agencies such the Bureau of Reclamation and the Tennessee Valley Authority although the application varies by agency and mission. Most of this development has been rooted in laws and administration policies that added key concepts to the planning framework and the procedures for estimating costs, benefits, and impacts. These policies and procedures reflect the Nation’s priorities at that time, as discussed below.

c. Congress and the Executive Branch have long recognized the role of social factors in water resources plan formulation, evaluation, and decision-making processes. The OSE account has appeared, in various forms and nomenclatures, in federal guidance as described below.

1–8. The Green Book and U.S. Bureau of Budget Circular A-47

Budget concerns in the 1930's and 1940's led to increasing demands for greater rigor in the analysis of the economic benefits of project costs. In 1950, the Proposed Practices for Economic Analysis of River Basin Projects was first published. This report became known as "The Green Book." The Green Book states that the objective of economic analysis is "…to provide a guide for effective use of the required economic resources…" and the general objective of project formulation is "…to maximize net economic returns and human satisfactions from the economic resources used in the project." The U.S. Bureau of the Budget Circular A-47 was issued in 1952 and incorporated most of the Green Book's findings into the guidelines. Circular A-47 imposed strict economic criteria on water projects, generally requiring that economic benefits exceed economic costs. The Green Book was revised in 1958 to reflect Circular A-47.

1–9. Senate Document 97

a. As a result of Congressional concerns with Circular A-47, in 1962 Congress published the Policies, Standards, and Procedures in the Formulation, Evaluation and Review of Plans for Use and Development of Water and Related Land Resources, which later became known as "Senate Document 97." Senate Document 97 called for the "best use, or combination of uses, of water and related land resources to meet all foreseeable short or long-term needs," with full consideration given to "Development (economic development and growth), Preservation (stewardship of the Nation's natural bounty), and the Well-being of People."

b. Senate Document 97 also called for "reasoned choices" to be made between Development, Preservation, and the Well-being of People when they conflicted. Well-being of People included the hardships experienced by and basic needs of particular groups, but development for the benefit of the few or the disadvantage of the many was to be avoided. This also allowed for the saving of lives to be considered along with reductions in property damage.

1–10. The Flood Control Act of 1970

In the Flood Control Act of 1970 (Public Law 91-611), Congress declared its intent concerning the importance of multiple objectives for water resources development. Section 209 of this Act states, "It is the intent of Congress that the objectives of enhancing regional economic development; the quality of the total environment, including its protection and improvement; the well-being of the people of the United States; and the national economic development are the objectives to be included in federally financed water resources projects, and in the evaluation of benefits and costs attributable thereto, giving due consideration to the most feasible alternative means of accomplishing these objectives." This was later codified in 33 USC 2281.

1–11. Principles and Standards for Planning Water and Related Land Resources

The Water Resources Planning Act of 1965 (Public Law 89-80) established the U.S. Water Resources Council, which had among its other duties the development of standards and criteria for planning and evaluating water resource projects. The efforts of its Special Task Force (1970) ultimately resulted in the promulgation of the "Principles and Standards of 1973" (P&S). The P&S had two objectives – NED and EQ. The social

wellbeing and RED accounts were described as “Other Beneficial and Adverse Effects” and were to be displayed where appropriate.

1–12. Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies

a. In 1983, the P&S were repealed by the Water Resources Council and replaced by the P&G. They were removed from the “Rules” section of the Federal Register and placed in the “Notices” section, thus becoming guidelines rather than rules for federal agency planning (National Resource Council, 1999). Shortly thereafter the Water Resources Council was defunded by the Reagan Administration, and the responsibility for the P&G moved to Office of Management and Budget (OMB). The P&G removed EQ as a Federal Objective, leaving NED as the sole Federal Objective for water resources development, consistent with protecting the Nation’s environment and following national environmental statutes, applicable executive orders (EO), and other federal planning requirements.

b. The four-account structure from the P&S remained in the P&G; however, the P&G noted that the NED account is the only required account for display. The OSE account (changed from the Social Well-Being account under the P&S) was to display urban and community impacts and effects on life, health, and safety. Since the P&G were adopted, OSE has been given limited attention in USACE water resource planning. The P&G require consideration of NED in the evaluation of alternative plans, but do not require consideration of RED, EQ, or OSE. Because OSE was rarely considered in alternative plan evaluation and decision making, USACE devoted few resources to it. A variety of expert panels has concluded that such single-minded focus on NED is inappropriate for contemporary water resources development needs.

(1) “Calculations of NED are meant to include all environmental and social benefits and costs for which monetary values can be obtained. The monetary focus on NED, however, does not give adequate consideration to unquantifiable environment and social values. Because of their nonmarket nature, EQ, ecosystem health, the existence of endangered species, and OSE are not as easily quantified in monetary values. This limits formulation and acceptance of projects capable of striking a better balance between flood damage reduction or other water resources development and the environment.” (Interagency Task Force on Flood Plain Management, 1994).

(2) The “P&G…do not adequately reflect contemporary water resources planning principles and practices…” An example of a specific revision to the P&G is the “movement away from the consideration of the NED account as the most important concern. Today, ecological and social considerations are often of great importance in project planning and should not necessarily be considered secondary to the maximization of economic benefits.” (National Research Council, 1999).

1–13. Water Resources Development Act of 1986

a. This landmark legislation fundamentally changed the water resources development “rules of the game” by mandating a two-phase planning process: an initial reconnaissance phase at full federal cost followed by a cost shared feasibility phase. The Water Resources Development Act (WRDA) of 1986 instituted broad requirements for sharing the cost of feasibility studies and water resources projects between the

Federal Government and local project partners. The intent of the legislation was to discipline the project development process by instituting beneficiary or “user pay” principles.

b. While most reviewers of the impact of WRDA 1986 conclude that cost sharing has had this intended effect, it has also been widely concluded that WRDA 1986 has led to a drive to find a cost share partner as quickly as possible and formulating a NED solution to water resources problems that is acceptable to the local partner, perhaps at the peril of broader water resources problems, needs, and opportunities.

c. Unintended consequences of WRDA 1986 include restricting the scope of water resources problems and opportunities being considered by USACE to conform to the interest of the study cost sharing partners (National Research Council, 2004b); promoting single-purpose projects developed on a project-by project, piecemeal basis; and reducing interest in broader-scale, integrated water resources management (IWRM) approaches with more comprehensive solutions at regional or basin scales (National Research Council, 2004a; National Research Council, 1999).

1–14. Water Resources Development Act of 1996

WRDA 1996 initiated the emphasis of an ecosystem restoration mission that focused on establishing the ecological processes necessary to make terrestrial and aquatic ecosystems sustainable, resilient, and healthy under current and future conditions. The mission has continued to evolve with directive legislation for USACE to consider during formulation, such as beneficial use of dredge material, use of natural and nature-based features (NNBF), and use of wetland and stream protection and restoration to reduce flood risks where those approaches are viable.

1–15. Water Resources Development Act of 2007

a. After WRDA 1986, the continued evolution of water resources guidance has been in the form of guidance from Congress. In WRDA 2007 Section 2031, the Secretary was directed to revise the P&G to ensure that the following considerations are addressed. “In developing revisions to the principles and guidelines under paragraph (2), the Secretary shall evaluate the consistency of the principles and guidelines with, and ensure that the principles and guidelines address, the following:

(1) The use of best available economic principles and analytical techniques, including techniques in risk and uncertainty analysis.

(2) The assessment and incorporation of public safety in the formulation of alternatives and recommended plans.

(3) Assessment methods that reflect the value of projects for low-income communities and projects that use nonstructural approaches to water resources development and management.

(4) The assessment and evaluation of the interaction of a project with other water resources projects and programs within a region or watershed.

(5) The use of contemporary water resources paradigms, including IWRM and adaptive management.

(6) Evaluation methods that ensure that water resources projects are justified by public benefits.”

b. Until the P&G were revised, USACE guidance placed much greater emphasis on the importance of including a broad range of considerations in planning. In addition to NED factors, other considerations, including social factors addressed in the OSE account, are to be used to develop appropriate water resources solutions.

(1) This charge also encouraged planners to collaborate with stakeholders and partners to develop and recommend plans that provide additional benefits and/or avoid negative impacts, and not simply what was once viewed as federal or primary budget priority benefits.

(2) This approach, in effect, encourages planners to explore more holistic, intergovernmental, and inter-sectored solutions that may be more efficient and effective than plans adhering to more narrow definitions of "federal interest" or "USACE interest." It is important to recognize that the implications of considering the four P&G accounts are not just for the non-federal partners and other stakeholders (though cost sharing policies concerning NED plans remain in effect). Project delivery teams (PDTs) could formulate plans that are quite different from what had been formulated in the recent past.

c. Under Section 2033, WRDA 2007 also introduced further requirements for the conduct of feasibility studies to include assessments; process improvements; benchmarks for length of studies; calculation of benefits and costs; and Planning Centers of Expertise. Section 2034 required mandatory independent peer review of certain projects based upon cost, a request by a governor, or controversy.

1–16. Principles, Requirements, and Guidelines

a. In 2009, the Council on Environmental Quality (CEQ) led an interagency effort to modernize the P&G and concluded in 2013 and 2014, when the Water Resources Council issued the Principles and Requirements for Federal Investments in Water Resources in 2013 and the Interagency Guidelines in 2014 (together the PR&G). The PR&G emphasizes that water resources projects should maximize economic development, avoid the unwise use of floodplains, and protect and restore natural ecosystems. The PR&G are designed to support water infrastructure projects with the greatest public benefits (economic, environmental, and social benefits).

b. During that time, CEQ also directed and coordinated the development of agency specific procedures (ASPs) by each affected water resources agency in 2014. Except for USACE, those ASPs were completed by all water resources agencies and approved by CEQ. For several years, beginning in 2015, Congress included direction in the annual USACE appropriation bills that prohibited USACE from developing ASPs to implement the PR&G.

1–17. Specific, Measurable, Attainable, Risk-Informed, Timely Planning

a. In 2012, in response to concerns by the Administration and Congress, USACE implemented a new expedited project delivery process to conduct feasibility studies, referred to as "SMART" Planning: Specific, Measurable, Attainable, Risk-Informed, and Timely. As part of this approach, USACE planners were to use and document a risk-informed approach to decision making. Specifically, USACE is to consider risks and uncertainty at each point in the feasibility study process and balance the probability and

consequences associated with those risks with the time and costs needed to avoid or mitigate risks.

b. The Water Resources Reform and Development Act (WRRDA) of 2014 codified the internal expedited project delivery processes for water resources feasibility studies by limiting the time and funding for producing a feasibility study, known as the "3x3x3 Rule." WRRDA 2014 also instituted single phase planning by eliminating the reconnaissance phase that began in WRDA 1986.

1–18. Water Resources Reform and Development Act of 2014, Water Resources Development Acts of 2016, 2018, and 2020

The Water Resources Reform and Development Act of 2014 (WRRDA 2014) and the Water Resources Development Acts of 2016, 2018, and 2020 (WRDA 2016, WRDA 2018, and WRDA 2020 (Public Law 116-260)) continued to expand the opportunities for interested Tribes, non-federal entities, including private entities, to have greater roles in project development, construction, and financing as well as assistance to those communities with aging flood and coastal risk management infrastructures, port facilities, and environmental infrastructure.

a. WRRDA 2014 also introduced the Water Infrastructure Finance and Innovation Act (WIFIA), which is intended to increase flexibility for non-federal partners and leverages private sector investments to increase the effect of federal funding. Other Congressional direction expanded the use of advance funding, contributed fund use, and crediting to non-federal partners.

b. Congressional emphasis in each WRDA since 2014 has directed the Secretary and USACE to broaden the formulation strategies with a focus on use of beneficial use dredge material, NNBF, sediment management, climate change, resiliency, drought, water supply storage and conservation, the Tribal Partnership Program (33 USC 2269), equity and environmental justice, and life safety.

c. In addition, the Assistant Secretary of the Army for Civil Works (ASA(CW)) provided guidance to streamline internal report processes, evaluate comprehensive benefits to include in the USACE decision framework that considers, in a comprehensive manner, the total benefits of project alternatives, including equal consideration of economic, environmental and social categories, expand funding priorities for programs that can assist urban and rural communities with environmental justice concerns, and implement guidance for environmental justice initiatives.

d. WRDA 2020 Section 110, Implementation of Water Resources Principles and Requirements, directed the Secretary to issue ASPs.

1–19. The Federal Objectives

a. WRDA 2007 established the Federal Objectives for water resources investments. Federal water resources investments must reflect national priorities, encourage economic development, and protect the environment by:

(1) Seeking to maximize sustainable economic development;

(2) Seeking to avoid the unwise use of floodplains and flood-prone areas and minimizing adverse impacts and vulnerabilities in any case in which a floodplain or flood-prone area must be used; and

(3) Protecting and restoring the functions of natural systems and mitigating any unavoidable damage to natural systems.

b. In consideration of the many competing demands for limited federal resources, it is intended that federal investments in water resources should reasonably maximize all benefits, with appropriate consideration of costs. Public benefits encompass environmental, economic, and social goals, include monetary and non-monetary effects, and allow for the consideration of quantitative and qualitative metrics (CEQ, 2013).

c. Planning studies should provide the partner, Tribes, state and federal agencies, stakeholders, and decision makers with an opportunity to compare alternatives to water resource problems and examine the important trade-offs that are present among those alternatives. The trade-offs are to be expressed in economic, social, and environmental quality metrics to assess the degree to which the Federal Objectives are met by each alternative. USACE uses a structured planning process and framework to facilitate that comparison of alternatives and assessment of trade-offs. The framework in turn is guided by a set of principles to provide reasonable consistency across USACE programs and other federal water resource agencies.

1–20. Guiding Principles

The following Guiding Principles constitute the overarching concepts the Federal Government seeks to promote through federal investments in water resources now and into the foreseeable future (CEQ, 2013).

a. Healthy and resilient ecosystems.

(1) Federal investments in water resources should protect and restore the functions of ecosystems and mitigate any unavoidable damage to these natural systems. In addition to hardened structures, NNBF can be used to augment the resilience of flood-risk management projects and coastal areas threatened by sea level rise and coastal storms. Ecosystems are dynamic complexes of plant, animal, and microorganism communities and the non-living environment interacting as a system. Ecosystems provide important services to humans both directly and indirectly, and they also encompass vital intrinsic natural values, such as biodiversity.

(2) To protect ecosystems, planners should first seek to avoid any adverse environmental impact, and when that is not possible, planners should analyze alternatives that minimize environmental impacts. When damage to the environment is unavoidable, compensatory mitigation for adverse effects is required (33 USC 2283).

(3) Restoration of ecosystems can enhance the health and resilience of the natural environment and should be part of alternative plans, where feasible and appropriate.

(4) Resilient systems that are designed in anticipation of, with preparation for, and with adaptive features that can withstand, respond to, and recover rapidly from chronic stresses and significant episodic shocks is a primary objective for water resources planning.

(5) Healthy and resilient ecosystems not only enhance the essential services and processes performed by the natural environment, but also contribute to the economic vitality of the Nation.

b. Sustainable economic development. Federal investments in water resources should encourage sustainable economic development. Alternatives for resolving water resources problems should improve the economic well-being of the Nation for present

and future generations through the sustainable use and management of water resources ensuring both water supply and water quality. Sustainable in this context means the creation and maintenance of conditions under which humans and nature can coexist in the present and into the future. Federal investments in sustainable economic development activities contribute to the Nation's resiliency.

c. Floodplains.

(1) Floodplains are critical components of watersheds. They connect land and water ecosystems and support high levels of biodiversity and productivity. Floodplains that have not been adversely affected can sustain their natural functions and increase the resilience of communities. For this reason, Federal investments in water resources should avoid the unwise use of floodplains and flood-prone areas and minimize adverse impacts and vulnerabilities in any case in which a floodplain or flood-prone area must be used.

(2) Unwise use of floodplains is any action or change that has an unreasonable adverse effect on public health and safety, or an action that is incompatible with or adversely affects one or more floodplain functions that leads to a floodplain that is no longer self-sustaining.

(3) Federal actions should seek to minimize the Nation's vulnerability to floods and storms. In instances where no feasible solution is identified, the agency should identify and communicate the potential direct and indirect adverse effects on floodplain functions.

d. Public safety. Threats to people, including both loss of life and injury, from natural events should be assessed in the determination of existing and future conditions, and, ultimately, in the decision-making process. Alternatives, which include structural, nonstructural, and natural and nature-based elements, must avoid, minimize, and mitigate risks to the extent practicable and include measures to manage and communicate residual risks. The impact and reliability of alternatives on these threats must be evaluated and shared with the public and decision makers.

e. Environmental justice and equity.

(1) "Environmental justice" is defined as the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and beneficial outputs of federal projects and programs, and in the enforcement of environmental laws, regulations, and policies.

(2) Agencies should ensure that federal actions are focused on achieving environmental justice by identifying and addressing the distribution of benefits, and identifying any disproportionately high and adverse public safety, human health, or environmental burdens of projects on communities impacted by environmental justice concerns in decision documents. Agencies must seek alternatives that would eliminate or avoid disproportionate adverse effects on these communities. Specific efforts must be made to provide opportunities for effective public participation by communities impacted by environmental justice concerns in federal water resource planning by improving access to USACE Civil Works technical services and maximizing the reach of Civil Works projects to benefit communities impacted by environmental justice concerns.

(3) These efforts include identifying the water resource needs, potential alternatives and beneficial and adverse effects and mitigation measures in consultation with affected communities and improving the accessibility of public meetings, documents, and notices. Further, evaluation methods should eliminate any biases and fully display the beneficial and adverse effects of alternative actions on all communities impacted by environmental justice concerns.

f. Watershed approach.

(1) A watershed is land area that drains to a common waterbody. A watershed approach to analysis and decision making facilitates evaluation of a more complete range of potential alternatives and is more likely to identify the best means to achieve multiple goals over the entire watershed.

(2) A watershed approach facilitates the proper framing of a problem by evaluating it on a system level to identify root cause(s) and its interconnectedness to problem symptoms. The approach enables the design of alternatives that consider the benefits of water resources for a wide range of stakeholders within and around the watershed. It promotes the evaluation of effects within a watershed and other interconnected systems to understand a full range of public benefits.

(3) The effects evaluated should include direct, indirect, and any cumulative effects on the watershed that result from the incremental impact of an action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Finally, the watershed approach allows for consideration of upstream and downstream conditions, needs, and potential impacts of proposed actions.

1–21. Organization of this regulation

a. This regulation is organized to first present a generalized framework and process that are used in all planning efforts, then presents the mission-specific application and considerations in subsequent chapters. Chapter 2 describes the planning framework that provides structure for the plan formulation and evaluation process, incorporating multiple iterations of the planning framework into decision making.

b. The ASA(CW) is responsible for formulating, evaluating, and recommending projects for implementation for various water resources mission areas. Chapters 3 through 10 are specific to each of the water resources purposes under the Secretary's authority. The mission-specific chapters describe the laws and policies that govern how the general planning framework and principles are to be used to meet the Federal Objectives. When studies and projects are undertaken based on specific Congressional authorization, analyses should be consistent with the principles in paragraph 1-20 and chapter 2, and should be aligned with ongoing efforts and actions by partners and stakeholders. The principles apply to all studies, but law and policy may cause application to vary. The mission-specific chapters are:

(1) Chapter 3: Navigation.

(2) Chapter 4: Flood Risk Management.

(3) Chapter 5: Coastal Storm Risk Management.

(4) Chapter 6: Ecosystem Restoration.

(5) Chapter 7: Hydroelectric Power Generation.

(6) Chapter 8: Recreation.
(7) Chapter 9: Water Supply Storage.
(8) Chapter 10: Multiple Purpose Studies.

Chapter 2
Planning Framework

2–1. Introduction

This chapter presents the USACE planning framework, and the general requirements for a quality and timely planning study. The goal of the planning process is to ensure that recommended actions add economic, environmental, and social value to watershed resources. USACE employs a multi-part planning framework to bring structure to the technical evaluations and development of decision information. This chapter describes the fundamental planning concepts and components of the planning framework. The framework is applied in an iterative planning process to complete feasibility studies.

2–2. Planning framework

a. The planning framework is used to characterize the water resources needs in a study area and to evaluate the potential alternatives that would address those needs. WRDA 1986 directs that planning decision documents communicate the uncertainty in benefits, costs, and impacts of alternatives and investment recommendations. This is an explicit statement that reporting documents are to communicate the uncertainty in the planning evaluations, the expected performance of the alternatives, and most importantly the expected effects of the recommended actions.

b. The USACE planning process follows the six-step process defined in the P&G. This process is a structured approach to problem solving that provides a rational framework for sound decision making. The six-step process will be used for all planning studies conducted by the USACE. The process is also applicable for many other types of studies and its wide use is encouraged. The six steps are:

(1) Step 1 – Identifying problems and opportunities.
(2) Step 2 – Inventorying and forecasting conditions.
(3) Step 3 – Formulating alternative plans.
(4) Step 4 – Evaluating alternative plans.
(5) Step 5 – Comparing alternative plans.
(6) Step 6 – Recommendation of a plan.

c. USACE decision making is generally based on the accomplishment and documentation of all of these steps. It is important to stress the iterative nature of this process. As more information is acquired and developed, it may be necessary to reiterate some of the previous steps. The six steps, though presented and discussed in a sequential manner for ease of understanding, usually occur iteratively and sometimes concurrently. Iterations of steps are conducted as necessary to formulate efficient, effective, complete, and acceptable plans.

2–3. Planning fundamentals

As discussed in chapter 1, the formulation and evaluation strategies continue to evolve and provide rigor in the decision-making process.

a. Integrated water resources management. IWRM applies a holistic focus on water resources challenges and opportunities. IWRM approaches reflect coordinated development and management of water, land, and related resources while maximizing economic services and environmental quality, and ensuring public safety while providing for the sustainability of vital ecosystems. The Federal Flood Risk Management Standard is an example of applying the IWRM approach for federal agencies considering current and future flood risks with a flood standard that aims to build a more resilient future.

b. Without- versus with-action conditions. The USACE planning framework relies on a comparison between conditions that would exist if no federal action were taken, and the conditions that would exist with a federal action in place. This without- versus with-action comparison is the basis of a comparative analysis of the direct, indirect, and cumulative effects of alternative solutions, and is the foundational purpose of the planning analysis. The planning framework therefore is oriented around characterizing the water resource needs, evaluating the alternatives available to address those needs, and making a recommendation as to whether one of those alternatives is preferred to the without-action condition.

c. Comprehensive benefits, impacts, and costs. Benefit categories encompass economic (national and regional), environmental (national and regional), and social considerations. Economic, social, and environmental benefits, impacts, and costs are to be identified, measured, and/or qualitatively characterized using four P&G accounts.

(1) Formulation of alternatives should evaluate and provide a complete accounting, consideration, and documentation of the total benefits of alternative plans across all benefit categories. Total benefits involve a summation of monetized and/or quantified benefits, along with a complete accounting of qualitative benefits, for project alternatives across national and regional economic, environmental, and social benefit categories.

(2) Reports should include a full discussion and display of the benefits, both positive and negative, in total and across all benefit types for each plan and a comparison of costs and benefits among plans. Trade-offs between the plans must be described and, where possible, displayed quantitatively. Cost sharing responsibilities for each plan must be assessed and included in the report, including displays. Any overlap in benefits among the benefit types, such as national and regional economy types, must be noted in the report and displays.

d. Benefit-cost framework. USACE uses benefit-cost analysis as the conceptual framework used in evaluating water resources investment. Benefits that can be reasonably monetized should be. However, this does not imply that all benefits are to be measured in monetary terms. The benefit-cost analysis framework is intended to ensure a structured and objective comparison of the beneficial and adverse effects of alternatives, using a consistent set of procedures and analytical principles, whether those benefits are monetary or non-monetary. All study teams must evaluate and provide a complete accounting, consideration, and documentation of the total benefits of alternative plans across all benefit categories described under paragraph 2-3*c*.

e. Equity and environmental justice. USACE studies will focus on a comprehensive evaluation of the total benefits of each plan including equal consideration of applicable benefit types in the study scope of work to include communities impacted by environmental justice concerns. Studies must show the recommended plan does not have disproportionately high and adverse human health,

economic, or environmental effects on communities impacted by environmental justice concerns, and recommended plans are formulated so that these populations are also beneficiaries of USACE programs.

f. Best available science and quality analysis. USACE will strive for the highest quality analysis and make use of the best available science and practices, thereby ensuring and maximizing the quality, objectivity, utility, and integrity of information (including statistical information) presented in planning documents. Quality analysis begins with a thorough understanding of the water resources that are under study, so that the appropriate technical data, tools, and analyses can be brought into the decision process. Study teams will consider the cost of obtaining information and completing analysis against the benefits of that information and analysis to decision making. Internal and external peer review is used to support quality analysis.

g. Risk-informed decision making. Risk is the effect of uncertainty on the objectives. Risk-informed decision making describes how risk and uncertainties are to be assessed, managed, and communicated throughout the USACE. This approach uses qualitative or quantitative risk assessment information in conjunction with other considerations to lead to more complete, transparent, and informed decisions. Study teams will use risk analysis to formulate, evaluate, and compare plans in terms of the likelihood and variability of their benefits, costs, impacts, and residual risks. Risks will be communicated to Tribes, the public, partners, stakeholders, and decision makers so that the problems and potential alternatives are understood, and risk management decisions can be made about who will take what actions to reduce and manage risks.

h. Uncertainty. Uncertainty is ever-present in the complex natural and constructed water resource systems USACE manages and studies. Teams must identify significant uncertainties and determine the appropriate action to accommodate or reduce those uncertainties. A critical requirement of risk-informed planning studies is to determine when decisions can be made with the uncertainties that remain at any point during a study and to explain how and by whom those remaining uncertainties can best be managed. Significant uncertainties are those that are sufficient to cause a change in formulation or plan recommendation, or that are sufficient to warrant attention after construction.

i. Climate change and climate variability. Climate change and climate variability are significant sources of uncertainty in water resource studies and evaluations. Studies must assess the climate change effects in the study area, particularly those that result from the acceleration of relative sea level change, and changing frequency and intensity of storms, floods, droughts, greenhouse gas emissions, and any other water resource risk drivers. A climate assessment for sea level change focuses on considering the direct, indirect, and cumulative impacts of changing sea level on project performance and stability.

j. Significant resources and significant effects. The consideration of significant resources and significant effects is central to plan formulation and evaluation for any type of water resources development project. Knowledge of resources and effects are derived from local communities and Indigenous Knowledge (Memorandum for Heads of Federal Departments and Agencies on Indigenous Knowledge, CEQ 2022), institutional, public, or technical recognition.

(1) Indigenous Knowledge refers to the evolving knowledge acquired by indigenous and local peoples over hundreds or thousands of years through direct contact with the environment. Indigenous Knowledge is a body of observations, oral and written knowledge, practices, and beliefs that promote environmental sustainability and the responsible stewardship of natural resources through relationships between humans and environmental systems.

(2) Institutional recognition of a resource or effect means its importance is recognized and acknowledged in the laws, plans, and policies of government and private groups.

(3) Technical recognition of a resource or an effect is based upon scientific or other technical criteria that establishes its significance.

(4) Public recognition means some segment of the populace considers the resource or effect to be important. Public recognition may be manifest in controversy, support, or opposition expressed in any number of formal or informal ways.

k. Ecosystem goods and services. USACE defines ecosystem goods and services as socially valued aspects or outputs of ecosystems that depend on self-regulating or managed ecosystem structures and processes. Ecosystem goods and services can be classified as being of an economic, environmental, and/or social nature and can be characterized as being of local, regional, and/or national in scope and significance. Ecosystem goods and services may align with or be beyond the scope of a given study or project authority, influencing the degree to which they might be relevant to the disclosure of its potential effects and the justification of a recommended action. As such, structured disclosure of effects and trade-offs in qualitative or quantitative terms is integral to any formulation effort in which ecosystem goods and services are considered during evaluation, comparison, or documentation of effects resulting from formulated alternatives.

l. Environmental compliance. Civil Works studies and projects must comply with all applicable federal environmental statutes and regulations. USACE will integrate processes to comply with federal environmental laws with the USACE risk-informed planning process to reduce process overlap and duplication. The integrated process will help assure that well-defined study conditions and well-researched thorough assessments of the environmental, social, and economic resources affected by the proposed activity are incorporated into planning decisions.

m. Hazardous, toxic and radioactive wastes. Policies related to hazardous, toxic and radioactive wastes are in ER 1165-2-132. In general, USACE will not participate in clean-up of hazardous, toxic and radioactive wastes regulated by the U.S. Environmental Protection Agency (USEPA) . USACE and the non-federal partner will share the costs of assessing the nature and extent of such materials within the project area during planning studies. PDTs will include the clean-up cost of HRTW in the benefit-cost analysis. USACE will not use aquatic ecosystem restoration projects to treat or otherwise abate pollution or other compliance responsibilities.

2–4. Planning framework in more detail

a. Step 1 – Identifying problems and opportunities.

(1) *Study initiation.* The success of the planning process depends to a great extent on establishing successful partnerships. USACE encourages the active outreach to and participation of all interested groups and use of the full spectrum of technical disciplines in activities and decision making. Non-federal partners, federal, state, and local agencies, Tribes, and public interests bring their expertise, programs, and projects together with USACE to solve complex water resources problems (42 USC 1962d-5b).

(a) A planning effort begins with the development of a clear scope to describe the purpose of the work, which is different from the National Environmental Policy Act (NEPA) scoping requirement. Study scoping processes include collaboration and engagement with federal and state agencies, Tribes, stakeholders, minority and low-income communities with environmental concerns, and non-governmental organizations in the accomplishment of planning studies. Collaborative efforts, which effectively combine federal, state, Tribal and local investments, can achieve greater economic, social, and environmental benefits than individual agencies acting alone.

(b) Non-federal partners are critical to successful completion of planning studies. Contributions from study partners and other stakeholders are often essential to provide details for existing and future conditions, and the shared data and expertise that arise through collaboration often lead to more comprehensive and sustainable alternatives. Planning teams must afford the non-federal partner the opportunity to actively participate in all aspects of the feasibility study, including defining the scope of the study, water resource needs, specific study tasks, risks, cost estimates, and schedules.

(c) Planning teams will develop and implement stakeholder and community engagement strategies to meaningfully engage the public throughout the planning process. Meaningful engagement means that those who are potentially affected by an action will have an opportunity to participate in processes that lead to recommendations that may ultimately affect their health or their environment; the public's contribution and concerns will be considered in the decision-making process. The engagement and outreach strategy should seek to proactively increase the communication with and participation by communities impacted by environmental justice concerns in the process to ensure that their needs are included and that benefits can be equitably distributed.

(2) *National Environmental Policy Act scoping.* Prior to NEPA scoping, an interagency meeting must be held within 90 days of study start with the cooperating and participating agencies and the non-federal partner for early coordination of environmental compliance activities and development of the environmental compliance timetable. Cooperating agencies will be requested for a complex Environmental Assessment or an Environmental Impact Statement.

(a) NEPA Scoping can start soon after the initial interagency meeting and will occur prior to the Alternatives Milestone Meeting to ensure any reasonable alternatives developed from the public (based on the study authority, purpose and need, objectives, and opportunities including alternatives with equal consideration of economic, social, and environmental categories) are included in the initial array of alternatives.

(b) This effort determines the scope of the NEPA analysis and is intended to ensure that problems are identified early and properly studied. It assures that issues of little significance do not consume time and effort. The scoping process should identify

the environmental issues and alternatives to be examined in the NEPA analysis while eliminating nonsignificant issues.

(3) *Study scoping.* The study scope should be developed with a systems perspective to understand the economic, social, and environmental interactions in the watershed, to the extent practicable. The scope will define:

(a) The study area;

(b) The identified water resources needs within the study area, framed in a systems/watershed context;

(c) The identified stakeholders and communities that may be affected by the potential federal investment and how the planning process will ensure collaboration with them, including collaboration on identifying the water resource needs of study area; and

(d) Clear statements of purpose and need, problems, opportunities, objectives, and constraints that will be used to guide the remainder of the planning work.

(4) *Iterations of the planning framework.* The planning team will complete a rapid iteration of the entire planning framework to assist with development of the scope of study and description of the water resources problem. The scope will frame the decision for the planning activity and will guide the development of information and feedback that will be used in decision making.

(5) *Identify data and analysis needs.* With full consideration of the combined input from external and internal partners and stakeholders, planning teams will identify the investigations necessary to formulate alternatives and complete a comprehensive assessment of benefits, costs, and environmental and social impacts. Existing and readily available information is used to complete the first full iteration of the planning process. The existing information will have its limitations, but vintage, source, purpose, or location of the analyses that produce the information are not sufficient reasons on their own to disqualify the information from use. Instead, these are sources of uncertainty that must be considered in the evaluation of risk to the study and represent knowledge gaps that must be filled through additional analysis. These additional analyses are the major elements of the scope of work for the study.

(6) *Coordination.* Coordination with Tribes, federal, state, local agencies, and communities is not only necessary to fulfill statutory requirements, but the knowledge, shared data, and expertise that arise through these processes may lead to more comprehensive and sustainable solutions. Shared data and expertise strengthen the planning analyses and lead to better water resource management for the Nation.

b. Step 2 – Inventorying and forecasting conditions.

(1) *With- versus without-project comparison.* The with- versus without-project comparison requires that a baseline condition be established for the study area. The baseline begins with the existing condition, which is then projected forward to establish the without-project condition.

(2) *Existing conditions inventory.* The existing conditions inventory should consider the quantity and quality of current and potential environmental, economic, and social (including health) resources and services found in the study area and the surrounding watershed, and the relationships and connections between them. Inventories should focus not only on the targeted water resources, but also on all of the interconnected resources that may be affected by a change in the targeted water resources.

(3) *Expected environmental conditions.* PDTs must forecast expected environmental conditions for the with- and without-project conditions, including climate change, climate variability, and sea level rise. PDTs may use data and information from a variety of different sources of information available from federal, state, and other natural resource management agencies, stakeholders, Tribes, and non-profits. PDTs must recognize and appropriately consider national, state, and Tribal environmental and health standards and regulations, including those concerning water quality, air quality, greenhouse gas emissions, public health, wetlands protection, and floodplain management.

(4) *Future without-project conditions.* Future without-project conditions that are reasonably foreseeable as existing in the absence of a federal action are the baseline for the assessment of meaningful effects of a potential project. The baseline without-project condition is established using the existing conditions, trends, and variability in the study area to forecast reasonably foreseeable future conditions over the period of analysis. The period of quantitative analysis should typically be no more than 50 years. An additional 50 years of qualitative analysis should be evaluated to assess potential climate change and climate variability and resiliency considerations. Social, economic, environmental, and other physical conditions should be included in the projection of future without-project conditions to:

(a) Understand how key resources and services will change in the future without a new federal action,

(b) Serve as a baseline to assess the effects of each proposed investment alternative, and

(c) Provide transparent documentation and communication of the meaningful effects of a project in its local or regional context.

(5) *Key assumptions.* Key assumptions used in the projections should be explicitly stated and planning teams should also include reasonably foreseeable actions by USACE, other public, and/or private entities in the expected future without project condition.

(6) *Future without-project documentation.* Planning teams must document the relationships and linkages of key resources and services, drivers of change, and current trends and variability in existing conditions. Key resources and services to be analyzed should be determined through collaboration with the Tribes, partner, public, agencies, local experts, and other stakeholders. The four P&G accounts – NED, RED, OSE, EQ – should be used to organize and display existing conditions, and the development of inventories should be done at a commensurate level of detail with the rest of the analysis.

(7) *Reasonably foreseeable future.* It is sometimes necessary to adjust the future without-project condition that is empirically most reasonably foreseeable so that the without-project condition will be policy compliant. For example, the without-project condition must assume that other entities will meet their existing legal responsibilities, including Operations, Maintenance, Repair, Replacement, and Rehabilitation (OMRR&R) of existing federal projects, even if those responsibilities are not currently being met. The PDT must identify the adjustments, the associated rationale whenever policy considerations require that such adjustments be made to the without-project

condition, and the associated uncertainties, all of which must be clearly described in decision documents.

(8) *Uncertainty.* Projections of future conditions are inherently uncertain, and the degree of uncertainty should be characterized (quantitatively and/or qualitatively at the commensurate level of detail) for all projections. Considerations should include population change, demographics, as well as other subjects such as climate change, sea level rise, and resiliency.

c. Step 3 – Formulating alternative plans.

(1) *Objectives and constraints.* The planning team will use the objectives and constraints to formulate measures and alternatives, along with contributions from the partner, Tribes, stakeholders, and the public. Planners will also use the four formulation and evaluation criteria to guide the development of alternatives: completeness, effectiveness, efficiency, and acceptability. However, application of the four criteria requires an explicit consideration of the effects of climate change, environmental justice, NNBF, and sea level rise. This requires that teams plan for uncertainty so that those uncertainties can be effectively managed later in the project life cycle.

(2) *Reasonable range of alternatives.* Planning teams are to formulate a reasonable range of alternatives, with significantly different approaches to address the defined water resources needs and the planning objectives established during scoping. Alternatives should:

(a) Be formulated to achieve the Federal Objectives and Guiding Principles;

(b) Comprehensively integrate multiple objectives for water resources; and

(c) Reflect a range of scales and management measures.

(3) *Initial array of alternatives.* The range of reasonable alternatives provides a basis for comparing the relative effectiveness and efficiency of the alternatives. Planning teams should consider alternatives that would be under the purview of federal agencies, Tribes, states, and local agencies and seek input as appropriate. Alternatives submitted by Tribal, State, and local governments and other public commenters during the scoping process are required to be considered as alternatives in the initial array. Alternatives that would not meet the purpose and need of the water resources project should be screened out. The PDT needs to document all alternatives submitted and the reason for screening alternatives out in the integrated NEPA/feasibility document. Among the more promising alternatives, planning teams should formulate alternatives of varying scales to enable the evaluation of incremental efficiency.

(4) *Formulation to objectives.* Planning teams should formulate alternatives to achieve economic, social, and environmental objectives.

(5) *Resiliency.* Projects should be resilient to remain effective in the face of uncertainty. The intent is to formulate alternatives that support climate resilient communities, economies, ecosystems, and infrastructure. Resilient systems are those that can anticipate, prepare for, and adapt to changing conditions and withstand, respond to, and recover rapidly from chronic stresses and significant episodic shocks. They are characterized by a flexibility to adapt, and often include redundant measures to account for uncertain future events and conditions that would exceed design assumptions.

(6) *Plans for Evaluation.* To facilitate discussion and evaluation of the trade-offs among the four P&G accounts – NED, RED, OSE, EQ – the array of alternatives must include, at a minimum, the following plans for evaluation. Among the multiple plans developed during formulation, the same alternative may be identified to meet more than one of the required plans listed below.

(a) The "no action" alternative.

(b) An NED or National Ecosystem Restoration (NER) plan.

(c) A plan that reasonably maximizes total net benefits across all benefit categories including monetized and non-monetized benefits.

(d) A plan that reasonably maximizes net benefits including monetized and non-monetized benefits consistent with the study purpose only.

(e) The least environmentally damaging practicable alternative, as required by the Clean Water Act under Section 404 (Title 40, Part 230 of the Code of Federal Regulations (40 CFR Part 230)).

(f) For flood risk management (FRM) studies, a nonstructural plan that includes modified floodplain management practices, elevation, relocation, buyout/acquisition, dry flood proofing, and wet flood proofing.

(g) A locally preferred plan (LPP), if requested by the non-federal partner and approved by the ASA(CW), if the LPP is not one of the plans identified above.

(7) *Avoidance of adverse impacts.* Formulation should seek to avoid adverse environmental, economic, and/or social impacts; however, trade-offs involved in addressing complex water resources problems mean that some alternatives may involve actions that produce unavoidable impacts. In these cases, alternatives should seek to avoid, minimize, and compensate these impacts. Social impacts — particularly those impacting Tribal and Indigenous populations, or communities impacted by environmental justice concerns — should also be avoided, minimized, and mitigated to ensure benefits accrue to those communities.

(8) *Lifecycle cost considerations.* Formulation should seek to avoid trade-offs between initial construction costs and lifecycle costs. Lifecycle cost considerations known at this point of the study should clearly differentiate alternatives in terms of the federal and non-federal total cost of ownership, including OMRR&R. (See ER 1110-2-8159, Life Cycle Design and Performance.)

(9) *Institutional barriers.* When an alternative requires removal of an institutional barrier (that is, the alternative would only be acceptable with the proposed change, such as a statutory revision), it should also include a description of any other environmental, economic, or social (including health) effects of removing the institutional barrier to be considered complete.

d. Step 4 – Evaluating alternative plans.

(1) *Comprehensive accounting.* The goal of the evaluation process is to provide a complete and comprehensive accounting of the benefits, costs, impacts, and risks expected from each alternative. A comprehensive accounting would illustrate whether and how economic, social, and environmental conditions are impacted relative to the no-action baseline. The evaluation includes the distribution of the project effects geographically and among the population groups, including the benefits and impacts. USACE will compare whether the impacts to populations and communities are disproportionately high and adverse when aggregated with cumulative impacts to those

same communities, and when compared to impacts on the general population. The traditional NED evaluation procedures measure the national economic value of the primary USACE water resources purposes, but procedures are limited for measuring other aspects of value. New procedures for other benefit categories should be incorporated as they are developed.

(2) *Formulation and evaluation.* The formulation and evaluation of alternatives must contain sufficient detail to be useful in decision making and must assess, document, and communicate:

(a) How comprehensive benefits of an alternative compare to its risks, costs, and impacts;

(b) How alternatives perform with respect to the Federal Objectives and Guiding Principles; and

(c) How alternatives perform against the four formulation and evaluation criteria: completeness, effectiveness, efficiency, and acceptability.

(3) *Four formulation and evaluation criteria.* Each alternative must also be evaluated on meeting the four formulation and evaluation criteria: completeness, effectiveness, efficiency, and acceptability.

(a) Completeness is the extent to which the alternative plans provide and account for all necessary investments or other actions to ensure the realization of the planning objectives, including actions by other federal and non-federal entities. Completeness must consider the sustainability and long-term aspects of the plans and whether all resource requirements are included. Completeness does not mean that all planning objectives are fully realized, only that the required resources and actions are included to achieve the estimated benefits.

(b) Effectiveness is the extent to which the alternative plans contribute to achieving the planning objectives. Benefit metrics reflect the effectiveness of each alternative. Effectiveness does not mean that all planning objectives need to be addressed or fully realized. The degree of effectiveness will be used to illustrate the trade-offs between plans when compared.

(c) Efficiency is the extent to which an alternative plan is a cost-effective means of solving the problem and achieving the objectives. Efficiency is determined through a comparison of the costs and benefits of each alternative.

(d) Acceptability is the workability and viability of the alternative plan with respect to acceptance by state and local entities and the public and compatibility with existing laws, regulations, and public policies. Acceptability has two dimensions – implementability and satisfaction. Implementability means the extent to which the alternative is feasible from a technical, financial, and legal perspective. Satisfaction is the extent to which the plan is welcome from a political or preferential perspective.

(4) *Evaluation.* Alternatives must be evaluated for the potential effects based on the scope and scale of the evaluation of direct, indirect, and cumulative effects as well as climate change, and recommendations should include actions required for resilience.

(5) *Complete systems approach.* Alternatives should be evaluated as complete systems. These evaluations must also fully consider the array of economic, environmental, and social effects — quantifiable (monetary and non-monetary) and non-quantifiable effects — and must be displayed in a transparent manner to help inform the

Tribes, public, partners, stakeholders, and decision makers of trade-offs that occur when discrete measures are included or excluded from the alternative.

(6) *Comparing public benefits.* The differences in benefits, costs, and impacts provided by each alternative, relative to the baseline, are the basis for comparing public benefits. The four P&G accounts should be used to organize and display existing conditions, and the development of inventories should be done at a commensurate level of detail with the rest of the analysis. Changes in benefits, costs, and impacts resulting from a proposed alternative, if they will substantively affect the decision-making process, must be quantified in a scientifically valid and accepted manner.

(7) *Quantitative effects.* Whenever appropriate, quantified effects should be monetized. Monetization should follow sound economic principles and practices. Discounting is to be used to convert future monetary values to present or annualized values.

(8) *Qualitative effects.* Those benefits, costs, or impacts that cannot be acceptably quantified must be qualitatively described in sufficient detail so that the decision maker can understand the importance and magnitude of the changes including meaningful differentiation between alternatives. If the non-quantified effects are likely to be important, "threshold" or "break-even" analyses are approaches that may be useful to evaluate their significance and should be adequately described. Whatever analytical technique is used, reports should indicate, where possible, which qualitative benefits, costs, and impacts are most important and why.

(9) *Lifecycle cost analysis.* Due to discounting, construction costs and lifecycle costs cannot be assessed reasonably through traditional benefit cost analysis alone. In the absence of deliberate lifecycle cost analysis, trade-offs between construction costs and lifecycle costs may appear attractive by transferring construction costs to downstream or total lifecycle costs, potentially threatening the long-term sustainability of the solution. Lifecycle cost considerations should clearly differentiate alternatives in terms of the federal and non-federal total cost of ownership and ability to sustain the solution long-term.

(10) *Viable plans.* PDTs must not eliminate or avoid viable plans because a partner or stakeholders prefer a different alternative, or because state law or local ordinance preclude the alternative. Instead, the alternative should be evaluated for its costs, benefits and impacts, and an explicit evaluation of trade-offs completed to compare the plan to other plans and/or measures that address the concerns that are raised. Partner and public preferences, satisfaction, and compliance with state laws and local ordinances should be discussed in the evaluation and comparison of alternatives.

e. Step 5 – Compare alternative plans.

(1) *Comparative analysis.* The primary objective of this step is a comparative analysis of alternatives, and there are two comparisons of concern. First, each alternative is compared to the without-project condition, which is the future baseline. Second, each alternative is compared to all other action alternatives to identify differences in costs, benefits, risks, and impacts among the choices that are available.

(a) These factors must be considered in the context of the project lifecycle, including OMRR&R. Construction costs and lifecycle costs must be compared in terms of total cost of ownership, not merely in present value terms. Lifecycle contrasts should highlight anticipated maintenance and rehabilitation comparisons, as well as the federal

and non-federal interest's ability to sustain the project given these requirements. This is the basis of the trade-off analysis.

(b) The planning team is to assess and communicate the degree of uncertainty in the decision metrics, and the potential effects of those uncertainties on achieving the project objectives.

(2) *Uncertainty.* Planning teams should discuss these uncertainties with respect to the four formulation and evaluation criteria (effectiveness, efficiency, acceptability, and completeness) and the Federal Objectives and each of the Guiding Principles outlined in chapter 1. However, there may be other evaluation criteria identified that may be used based on the identified risk drivers. To do this, it will first be necessary to document the uncertainty in the metrics displayed in the table of effects, which organizes the metrics according to the four P&G accounts – NED, RED, OSE, EQ.

(3) *Table of effects.* Planning teams will display the results of the evaluation process in a table of effects, supported by charts, illustrations, photos, and summary statements as needed to objectively describe the contributions of each alternative, including the no action alternative, to the Federal Objectives and each of the Guiding Principles. The table of effects should present the performance of each alternative, relative to the baseline, the study objectives, the four formulation and evaluation criteria, and any other screening or selection criteria used in the analyses.

(4) *Consistency between alternatives.* For transparency and ease of use, the method of display for a specific category must be the same across all alternatives. Displays help the public and the decision maker to understand the similarities and differences among alternatives, the effectiveness of alternatives in addressing the project purpose or purposes, the environmental impacts and the trade-offs in quantified and unquantified benefits and costs among the various alternatives. This comparison should be documented in both display and narrative form and include a discussion of trade-offs.

(5) *PDT recommendations.* PDT recommendations ultimately rely upon the deliberation between USACE and the partners, public, and other stakeholders about the assessments of trade-offs, uncertainties, and resulting risks in the performance of the alternatives. PDT recommendations will be made through a comparison of how multiple criteria are affected, positively and negatively, by the alternatives. Trade-offs will be displayed and evaluated among the criteria, to provide transparent disclosure of how benefits and impacts are distributed among populations, businesses, and communities in and out of the study area. The trade-off evaluation should specifically describe the benefits and impacts, and their distribution, as the scale of investment is changed.

(6) *Trade-off discussion.* The trade-offs – monetary, quantitative, and/or qualitative — among and within economic, environmental, and social metrics must be explicitly identified across alternative plans. Trade-offs are compared from the perspective of the specific circumstances of each study, including the study area, resources, environmental impacts, impacted populations, and study authority, to form the basis for deciding which plan best addresses the Federal Objectives and Guiding Principles.

(a) Some effects measured are likely to be more relevant than others to the achievement of the investment objective, and these should be noted and separated from incidental effects. Planning teams should note effects that are irreversible or that have high end-of-lifecycle costs to reverse (including decommissioning costs).

(b) Different project components may be justified based on different types of benefits. Similarly, justification may be based on a combination of quantifiable (monetary and non-monetary) and non-quantifiable effects. The trade-offs among the goals and objectives of separable project components should also be identified to provide a basis for the rationale supporting their inclusion in or exclusion from the alternative.

(c) Discounting and other economic analysis techniques may understate the significance of sustaining a project component over its lifecycle for the non-federal interests. Federal and non-federal interests may access construction costs and lifecycle costs from different sources, affecting their ability to trade-off between construction costs and lifecycle cost burdens. Because financial data alone is not sufficient treatment, attention should be drawn to the need to place sustainability considerations over the lifecycle of the project into context beyond economic costs.

(d) The level of detail in assessing separable components, including lifecycle considerations, and the associated description of the specific trade-offs among the goals and objectives of the investment decision should be sufficient to inform the decisions to be made and to provide transparency to the decision-making process.

(7) *Identification of plans.* The following plans must be identified during the comparison of alternatives: the NED plan; the NER plan; the Total Net Benefits Plan, and the least environmentally damaging practical alternative.

(a) The NED plan is the alternative plan that reasonably maximizes net NED benefits consistent with protecting the Nation's environment. Planning teams must identify the NED plan for all project purposes except aquatic ecosystem restoration.

(b) For aquatic ecosystem restoration projects, a plan that reasonably maximizes aquatic ecosystem restoration benefits compared to costs, consistent with the Federal Objectives and Guiding Principles, must be identified. The plan must be shown to be cost effective to achieve the desired level of output. This plan is the NER plan.

(c) The plan that reasonably maximizes net benefits across all four P&G accounts in comparison to costs, is to be named the total net benefits plan. It is possible for there to be more than one alternative that reasonably and approximately maximizes the public benefits relative to costs, when planning teams consider the full array of economic, environmental, and social effects of an alternative in both quantitative and qualitative terms.

(d) The least environmentally damaging practicable alternative, as required by Section 404 of the Clean Water Act (40 CFR Part 230).

f. Step 6 – Recommendation of a plan.

(1) *Determination of a recommended plan.* After the direct, indirect, and cumulative effects of all alternatives have been described in the comparison of the alternatives, the determination of a recommendation for a plan is often focused on the cost-effectiveness of the plan in delivering all benefits, consistent with protecting the environment and achieving planning objectives.

(a) To the extent practicable, the criteria that the PDT will use to recommend a plan should be determined and agreed to with the vertical team at the start of the study but could be revisited as the study progresses.

(b) The recommended plan must be shown to be preferable to taking no action (if no action is not recommended) or implementing any of the other alternatives considered during the planning process.

(c) Formal multiple criteria decision analysis methods are available, but not required. If a formal multiple criteria decision analysis method is proposed for use, the planning team must coordinate with USACE Headquarters (HQUSACE) and obtain approval for the criteria and procedures to be used in the analysis.

(d) Determination of a recommended plan is based on a collaborative process between the planning team, non-federal partner, stakeholders, and the public. The criteria for determining the recommended plan differ, depending on the type of plan and whether project outputs are economic, environmental, social, or a combination thereof.

(2) *Recommended alternative discussion.* For the recommended alternative, planning teams must:

(a) Provide a complete discussion of the trade-offs;

(b) When the recommended plan includes structural components, describe risks and uncertainties about the sustainability of the plan, as well as uncertainties expected to be worked out in the design phase. The analysis should include the federal and non-federal sustainment of any structural components over the lifecycle of the project (capital investments forecasted in the benefit-to-cost ratio);

(c) Explain how economic, environmental, and social (including health) benefits (monetary and non-monetary, quantified and unquantified) justify the costs (monetary and non-monetary, quantified and unquantified); and

(d) Explain how the plan adequately attains the goals outlined in the Guiding Principles (paragraph 1-20), recognizing how trade-offs between the various goals affect the level of attainment within each Guiding Principle.

(3) *Communication during study development.* Frequent vertical team communication, participation in interim and focused discussions and Milestone meetings, and collaboration on solutions will be used to minimize the potential that significant adjustments will be needed to the process or study following the identification of the tentatively selected plan. The review feedback will guide how many elements of the planning framework need to be revisited. In most cases, the early coordination, communication, and deliberation with internal and external stakeholders is expected to reduce the likelihood that the entire process will be revisited. Instead, the review feedback is expected to indicate specific areas that need additional analysis to complete the evaluation of the tentatively selected plan for the final decision document.

(4) *Reiteration of planning framework steps.* In some cases, it is possible that all elements of the planning framework will have to be revisited and further explained if there is extensive vertical team feedback that questions the alternatives, how they were evaluated, and the basis for the recommendations. The planning team may need to provide additional information, clarify prior analysis or results, correct errors, or address similar issues that may lead to changes to the report details, while not leading to changes in the relative ranking of the alternatives and the tentatively selected plan. In any event, the review feedback will guide how many of the elements of the framework are revisited and to what extent they are revisited.

(5) *Draft report.* The output of this stage is a draft report that will be subject to review by internal technical, policy, and legal staff, plus the public, resource agencies,

and in some cases independent external technical peers. That draft report must transparently document the technical analyses that were completed and the objective assessment of the risk and findings as they are used in the decision process. Early external feedback that was received during scoping or other external engagement must be described along with how it was used in the formulation and evaluation process. Feedback and recommendations that were not adopted are important sources to be considered for identifying potential risks.

(a) A significant question that the team must answer is whether the tentatively selected plan continues to be the recommendation considering the review feedback that was received. The review comments are likely to result in updates to the prior analyses and resulting decision metrics that were used in the original tentatively selected plan recommendation.

(b) Updated information should be used to reiterate the evaluation and comparison of alternatives. The team should determine whether the tentatively selected plan holds, or a different plan is to be put forward for recommendation. If the prior tentatively selected plan does not hold, the formulation should be revisited to determine what changes to the plan are necessary. Project partners will be fully involved in the iterations and recommendation development process. This reiteration of formulation, evaluation, comparison, and determination of a recommended plan should be conducted as described in the prior iteration and according to the PR&G.

(c) An actionable recommendation is one that has a well-defined project, supporting environmental compliance document. The document should include a NEPA document, a certified cost estimate, a real estate plan, clear articulation of the OMRR&R investments necessary to sustain any structural solutions over the lifecycle of the project (including disposal), and established items of local cooperation. These are necessary items to prepare for implementation of the recommended project. Each of these determinations is to be risk-informed. An actionable recommendation should be supported by the non-federal partner and be in compliance with applicable federal laws, regulations and policies. The team is expected to document the sources of uncertainty and resulting risks.

(d) For projects requiring Congressional authorization or that are authorized subject to a determination by the Secretary, the process continues at the division and headquarters levels through subsequent reviews and approval. The final agency decision maker for these projects is the Secretary through the ASA(CW). If the district recommends a plan other than the NED plan, or NER for aquatic ecosystem restoration, an exception request must be prepared and submitted to the ASA(CW) for approval. The request must explain the overriding reasons for the exception, and the trade-offs among costs, and the economic, social, and environmental benefits that the plan would provide. If the recommendation is the plan that reasonably maximizes total net benefits across the four P&G accounts, it will be designated as the Total Net Benefits plan.

(e) The non-federal partner may also request ASA(CW) approval of a plan that deviates from the NED, NER, or total net benefits plan. This plan would be identified as the LPP.

(6) *Implementation strategy.* The implementation strategy should include identification of the risk management tools that are best suited to address risk during the implementation and/or operation of the recommended project. The planning team

should use the risk register to begin preparing for implementation of the project. Risk registers provide content for initial risk management plans that can be incorporated into project management plans during the implementation phases of the project. The cost and schedule risk analysis is a formal approach to assessing risks and identifying risk management options that can be used during design, construction, and operation of the project. Other tools to manage implementation risks may include monitoring and adaptive management plans, environmental compliance to include tiered NEPA documents when appropriate, expanded partnerships, alternative financing mechanisms, or similar actions.

(a) Attention by the project manager and planning team is needed in the development of an implementation strategy to ensure a smooth transition from planning to design and construction activities. The strategy should include the listing of items of local cooperation, real estate acquisition, the alignment of resources between USACE and the partner, the timing of agreements to be signed, and the other fundamental activities that comprise the implementation stage of the project. For projects with lower complexity, familiar components, a well-resourced partner, etc. the implementation strategy can be relatively straightforward and would simply describe the expected timeline for design and construction activities.

(b) As project complexity increases, the implementation strategy may also require additional considerations to address those complexities. This may be the result of additional partners having a role during implementation; it may be the result of the scale of the project; it may be complexity driven by environmental, social, or cultural impacts that require additional fieldwork, assessments, documentation, and perhaps additional public reviews; it may be that the project requires or is anticipated to require future adaptation actions or modifications to address changing conditions, including climate change and climate variability impacts.

Chapter 3
Navigation

3–1. Federal interest

Federal interest in navigation was established by the Commerce Clause of the Constitution and subsequent court decisions. Navigable waterways are important to the Nation as a primary means of commercial transportation and as a part of national defense. USACE's role in navigation is to provide safe, reliable, efficient, and environmentally sustainable waterborne transportation systems.

a. USACE's navigation mission is accomplished through a combination of feasibility studies, major rehabilitation projects, and operation and maintenance (O&M) of existing harbor and waterway projects. Feasibility studies explore improvement activities include the planning, design, and construction of new navigation projects or the modification of existing projects. Major rehabilitation and O&M activities are performed for existing improvements to the navigation of shallow and deep draft vessels using the Nation's harbors and waterways.

b. USACE port/harbor projects facilitate the movement of vessels that load or unload cargo or passengers or offer an area of refuge from inclement weather. USACE waterway projects are portions of routes (for example, navigation channels) and

structures on those portions of routes (for example, locks, dams with navigable pools, river training structures) used by vessels and primarily serve to connect bodies of waters. USACE projects may also be part of a riverine or coastal waterway system (for example, the Gulf Intracoastal Waterway).

c. District-analyzed capital improvement projects are typically characterized as deep draft navigation (harbor), inland or intercoastal navigation (waterway), or small boat/inland navigation (harbor). Except for projects implemented under continuing authorities, Congress specifically authorizes harbor and waterway projects. Regardless of purpose or depth, federal navigation improvements must be in the public interest and must be open for the use of all on equal terms. USACE harbor/port project depth and use determine not only the analyses required, but also the cost share requirements.

(1) *Deep draft navigation harbors (ports).* For USACE project construction, “deep draft” means navigation projects with depths exceeding -14 feet mean lower low water (MLLW). Deep draft navigation harbor/port projects, also referred to as “coastal navigation” projects, are geographically connected to the Nation’s coasts and Great Lakes but may include inland harbors that primarily service deep draft vessels (for example the Port of New Orleans, Louisiana).

(2) *Small boat harbors.* Small boat harbors are typically shallow draft (those harbors with depths equal to or shallower than -14 feet MLLW) facilities. As facility users vary, small boat harbors can also encompass deep draft channels that serve a wide variety of vessel types, such as commercial fishing, subsistence, recreation, float planes, government and research vessels, and barge deliveries. Small boat harbors are multiuse and can be standalone facilities or situated in combination with deep draft harbors, and can be located on the Nation’s coasts, lakes, or inland rivers.

(3) *Inland waterways.* Waterways, also referred to as inland and intercoastal navigation, are rights-of-way that enable and aid vessel movement. Waterways may connect bodies of deep or shallow water, or they may be parts of riverine or coastal waterway systems.

3–2. Navigation improvements

Although there are many components to a navigation project, federal financial responsibility is limited to a subset of those features. USACE participates financially in general navigation features (GNF) and special navigation programs only (see paragraph 3-7). With the exception of aids to navigation (ATONs) (a U.S. Coast Guard (USCG) obligation), all other features or facilities are non-federal responsibilities (33 USC 2211 and 33 USC 2212). Features that are a USACE responsibility are cost shared according to project purpose (such as commercial navigation or recreation) and type (for example, harbor or waterway).

a. General navigation features. GNF are necessary for the physical movement of vessels, often based on the design vessel, and are the foundation for the formulation of measures and alternatives. GNF may consist of the following categories of improvements:

(1) Harbor and waterway channels, including offshore approach and harbor entrance channels, main channels, and branch channels that connect harbor entrances with facilities.

(2) Protective jetties and breakwaters; breakwaters may be combined with jetties where required (EM 1110-2-1204).

(3) Basins, areas, or widened channels for vessel maneuvering, turning, passing, meeting, and anchoring/mooring (incidental to transit of channels or locks). This category includes within-channel sediment basins designed to capture and hold sediment.

(4) Dredged material placement facilities for harbors and for waterways that are treated as harbors for cost sharing purposes.

(5) Locks, dams, and river training works on waterways.

(6) Bridges that are required by new or realigned channels that cut fast land. However, USACE typically does not recommend new navigation channels that cut fast land since other less significant impact alternatives are usually available.

(7) Ice control structures.

b. Aids to navigation. ATONs are provided by the USCG and consist of buoys, lights, ranges, markers, and other devices and systems required for safe navigation.

c. Local service facilities. The local service facilities (LSF) for a navigation project are those lands, easements, rights-of-way, and relocations (LERR) for infrastructure components that are the full cost responsibility of the non-federal partner. LSF are necessary for a navigation project to obtain the benefits associated with a project. Examples of LSF include the following categories of infrastructure components:

(1) Piers, wharves, floats, and other structures or devices at or near the shoreline where vessels can moor or be held for the purpose of loading and unloading cargo/passengers, fueling, repairs and other servicing, or awaiting orders or use.

(2) Berthing, mooring, and anchorage areas where vessels can remain for as long as necessary without obstructing channels, and other water areas provided for the movement of vessels or mooring/anchorage areas used for the purpose of awaiting dock space are also LSF.

(3) Landside port facilities, open areas, structures, or equipment for receiving, storing, and transferring cargo and passengers; harbor facilities for providing fuel, water, ice, provisions, repairs, and other services to vessels; and recreation facilities for launching boats via ramps or equipment, storing boats on land, parking vehicles, public access areas, and restrooms.

(4) Utility services such as telephone, water, power, and public services, including police and fire protection.

(5) Land access via roadways and railroads.

(6) Access channels or main/branch channel extensions providing access to facilities usable exclusively by private interests (not open to the general public on equal terms).

3–3. Planning

The formulation and evaluation of navigation projects is conducted following water resources planning principles and processes in chapter 2. The risk-informed planning process elements in this chapter are universal for all three types of navigation: deep draft harbors, small boat harbors, and inland waterways. Subsections provide further detail regarding specific considerations for each. Additional implementing procedures can be found in Appendix E of ER 1105-2-100.

a. Standard planning assumptions – without-project conditions. PDTs will use the following assumptions for navigation studies. Deviation from these assumptions requires vertical team engagement and alignment.

(1) All reasonably expected nonstructural practices within the discretion of the operating agency, port agencies, other public agencies, and the transportation industry are implemented at the appropriate time. Any private or public sector transportation investments that are planned and reasonably expected to be constructed are also assumed to be implemented. Improvements in place, under construction, or authorized/permitted are assumed to be in place over the period of analysis.

(2) For studies that involve existing USACE navigation projects, O&M (and repair) practices that were included in project authorizing documents are assumed to be performed over the period of analysis, regardless of historical funding levels.

(3) In projecting commodity movements involving intermodal movements and in projecting traffic movements on other modes, sufficient capacity of the hinterland transportation network and related facilities and the alternative modes is assumed.

(4) Advances in technology affecting the transportation industry over the period of analysis must be considered, within reason. For example, without sufficient evidence that advances in technology could reasonably affect the transportation industry, waterway analyses should assume transportation price structures will remain constant over time.

(5) For waterway projects, user charges and/or taxes required by law are part of the without-project condition. Proposed or possible fees, charges, or taxes are not part of the without-project condition but should be considered as part of any nonstructural alternatives in the with-project condition.

b. Standard planning assumptions – with-project condition. PDTs will apply the same assumptions that underlie the without-project condition to the with-project condition.

c. Categorical exemption for the National Economic Development plan. If the non-federal partner identifies a constraint to maximum physical project size or a financial constraint due to limited resources, and if net benefits are increasing as the constraint is reached, the requirement to formulate larger scale plans in an effort to identify the NED plan is suspended. The constrained plan may be recommended. If the NED plan is identified at a physical size or cost which is less than the constraint, the NED plan requirement is satisfied, and the NED plan must be recommended.

3–4. Navigation evaluation policies

The evaluation policies in the following paragraphs are a summary of the overall requirements and procedures.

a. Climate change and climate variability. A climate assessment for sea level change considering the direct, indirect, and cumulative impacts of changing sea level on project performance and resiliency is required.

b. Commercial navigation. Commercial navigation benefits are a priority output for study and implementation funding; recreation navigation benefits are not. Congress expanded the definition of commerce to “include the use of waterways by seasonal passenger craft, yachts, house boats, fishing boats, motorboats, and other similar watercraft, whether or not operated for hire” (33 USC 541). However, this expanded

definition of “commerce” is not the same as “commercial navigation” for priority output purposes. For alternative evaluation and cost allocation purposes, subsistence fishing is considered commercial fishing.

(1) *Cruise ships.* Commercial navigation NED benefits may include cruise ships (33 USC 2284a).

(2) *Subsistence fishing.* For alternative evaluation and cost allocation purposes, subsistence fishing is fishing primarily for personal or family consumption by those whose incomes are at or below the minimum subsistence level set by the Department of Commerce. Although subsistence fishing is considered commercial fishing, it is not a high priority output under commercial navigation budgetary policies. The appropriate evaluation procedure depends on site-specific conditions. The basic requirement is to identify benefits based on willingness to pay. Evaluation based on changes in net income is preferable since subsistence fishing is not recreation. High priority outputs like those found in commercial navigation policies can be estimated in the form of efficiency gained or in the reduction of infrastructure and vessel damages. Subsistence fishing can also result in benefits in the OSE account, such as increasing access to subsistence resources, sustaining cultural values, maintaining community welfare, or supporting community viability.

(3) *Charter fishing craft, head boats, and similar recreation-oriented commercial activities.* Charter fishing craft may be considered commercial vessels in the evaluation of small boat navigation projects (33 USC 577a). Whether benefits associated with charter fishing craft are for recreation or commercial navigation, however, will determine consistency with the USACE primary missions. Commercial navigation benefits can only be claimed if there would be a change in net income to the owner/operators of vessels that would exist and operate in the without-project condition.

(4) *Economics values – national benefits.* The primary economic benefit for navigation projects is created by reductions in transportation resources, known as transportation rate savings (42 USC 1962a-2). For navigation studies, these benefits can be further classified into the following six categories: cost reduction benefits for existing movements, shift of mode, shift in origin, shift in destination, induced movement, and non-standard. Deep draft navigation projects use transportation cost savings (based on vessel operating costs) and inland waterways projects use transportation rate savings.

(5) *Economics values – national costs.* The economic costs in determining the benefit-to-cost analysis of navigation projects include LERR; dredged material disposal areas; construction elements (GNF); pre-construction engineering and design; construction management; fish and wildlife mitigation; historic properties mitigation; contingency; interest during construction; OMRR&R; LSF required to achieve project benefits; and associated costs (which include ATONs).

(6) *Federal user charges.* Federal user charges will be assessed for use of defined fuel taxed inland and intracoastal waterways (fuel tax) and at authorized harbors (harbor maintenance tax); non-federal partners may assess local user fees to recover their cost share. These fees do not reduce the NED cost of the project. Changes to user fees are a transfer of resources and not an NED benefit.

c. Shoreline changes. Each investigation of navigation improvements that includes the entrance at the mouth of any river or at any inlet must include analysis of the

probable effects on shoreline configurations resulting from project implementation (33 USC 546a). The PDT must analyze a distance not less than ten miles on either side of the improvement.

d. Land creation at harbors (other than inland harbors). The NED plan for harbor projects that include land creation benefits must be formulated using navigation benefits exclusively; thus, land creation benefits must not be considered in the identification of the NED plan. Special cost sharing is required for land creation benefits associated with the NED plan in proportion to the magnitude of these benefits to the total benefits. The procedure to estimate the cost sharing in this case is described in EP 1165-2-1.

e. Beneficial use of dredged material. Development of a placement method for each federal project may include a selection of a placement method that is not the least cost option if the incremental costs of the placement method are reasonable in relation to the environmental benefits or coastal storm or FRM benefits (33 USC 2326(d)). The environmental benefits of a placement method may include the benefits to the aquatic environment to be derived from the creation of wetlands and control of shoreline erosion. The coastal storm or FRM benefits may include shoreline protection, protection against loss of life, and damage to improved property.

(1) *Operation and Maintenance.* The placement method may include a single or periodic application of sediment for beneficial use and will not require O&M.

(2) *Acceptance of Other Funds*. USACE may accept funds from a non-federal interest to place dredged material that is not the least cost option.

f. Uncertainty. PDTs must focus on reducing instrumental uncertainties in navigation analysis that could affect the decision. Possible sources of instrumental uncertainty include study assumptions, predicted variables, estimated values, and parametric values that are critical to the report recommendation. PDTs must identify the point (value) at which a change in the critical variable would impact the decision.

g. Inland waterways. The cost estimate for a recommended plan funded at least in part from the Inland Waterways Trust Fund must be developed using risk-based cost estimating procedures with a confidence level of at least 80 percent (33 USC 2252).

3–5. Cost sharing requirements

Cost sharing requirements for the construction of a federal harbor project, or any separable element thereof, are defined in 33 USC 2211(a).

a. General navigation features. The non-federal cost share paid for GNF construction varies according to the channel depth: 10 percent for less than or equal to -20 feet MLLW, 25 percent for greater than -20 feet MLLW but less than or equal to -50 feet MLLW, and 50 percent for greater than -50 feet MLLW. If a project crosses cost share depth ranges, each applicable range should be used to determine overall cost share. Overdepth and advanced maintenance dredging are a maintenance strategy; cost sharing is at the controlling depth. Deepening construction contract costs are generally allocated between the USACE O&M account and Construction General account, however the material is often removed concurrently under one contract.

(1) *Cost share for non-channel depth improvements.* For project improvements where channel depth is not changing, such as breakwaters, locks, channel widening, etc., cost share is at the percentage applicable to the authorized or existing depth

(controlling depth of interior channel), whichever is greater. The percentage applies as well to mitigation and other work cost shared the same as GNF.

(2) *Cost share during construction*. The cost share is paid during construction. The non-federal partner is also required to pay an additional amount equal to 10 percent of the total construction cost for GNF, reduced by the value of creditable LERR. This may be paid, with interest, over a period not to exceed thirty years, and LERR may be credited against it.

(3) *Value of lands.* The value of lands provided for mitigation including any potential non-federal partner's incidental cost of acquisition are not creditable against this 10 percent since that value is cost shared as GNF.

b. Aids to navigation. The establishment, maintenance, and operation of maritime navigation aids are the responsibility of the USCG (14 USC 81). The USCG regulates all public and private ATONs for uniformity and conformity with the "lateral system" (denoting port and starboard sides of a route to be followed) of buoyage as described in Title 33 of the Code of Federal Regulations, Section 62.21 (33 CFR 62.21).

c. Local service facilities. LSF are the responsibility of the non-federal partner and included as an item of local cooperation in the project partnership agreement, and are thus a contractual requirement to construct, operate, and maintain the LSF required to achieve the benefits of the federally constructed navigation project.

d. Lands, easements, rights-of-way, and relocations. Non-federal partners are required to provide all LERR for a navigation project, a harbor of any kind, and for waterways that are treated as harbors for cost sharing purposes (33 USC 2211). LERR for waterways includes disposal areas (thus LERRD) and are a federal responsibility (33 USC 2212).

e. Utility relocations for deep draft harbors. The non-federal partner will perform or ensure the performance of all relocations of utilities necessary to carry out the project, except in the case of a project for a deep draft harbor and in the case of a project constructed by non-federal partners. In these instances, 50 percent of the cost of each utility relocation will be borne by the owner, and 50 percent of the cost of each utility relocation will be borne by the non-federal partner.

(1) *Credit for utility relocation.* Consistent with 33 USC 2211, USACE will credit towards the non-federal partner's additional 10 percent payment the costs borne by the non-federal partner to perform or ensure the performance of all utility relocations. However, the total cost of each relocation will not exceed the amount USACE determines to be necessary to provide the functionally equivalent facility.

(2) *Eligibility for reimbursement.* To the extent the total amount eligible for credit under 33 USC 2211 exceeds 10 percent of the cost of the GNF, the non-federal partner will not be entitled to reimbursement. Policy Guidance Letter 44 contains guidance pertaining to these activities as well as to activities related to removal of utilities not requiring replacement.

f. Inland waterways. The waterways described in 33 USC 1804, referred to as fuel tax waterways, are exempt from non-federal cost sharing of studies. Congress may authorize full federal funding for construction (including pre-construction engineering and design) involving fuel taxed waterways or other waterways. In such cases, the Inland Waterway Trust Fund is used to fund all or part of the construction, and the waterway may be made subject to waterway fuel taxes. O&M for fuel-taxed waterways

and other waterways designated by Congress is 100 percent federal. All other waterways are treated as harbors for cost sharing purposes.

g. Special cases. The following cases require a determination of federal responsibility for cost sharing.

(1) *Access channels.* Subsidiary channels may be needed to connect main harbor channels or inland waterways with anchorages, mooring, or berthing areas not located adjacent to the primary channel. An access or connecting channel can be a federal responsibility if it provides access to two or more areas or if it provides access to a single area that contains two or more facilities with separate owners or a facility owned by a public entity.

(2) *Barge fleeting areas.* Barge fleeting areas are not typically recommended for federal participation. However, moorages or temporary anchorage areas may be recommended for federal participation if they are required when implementing a nonstructural efficiency improvement (for example, if reconstitution of tows is necessary to implement a ready to serve lockage policy).

h. Federal project development by non-federal interests. Non-federal interests may undertake work on a federal navigation project for which they may be eligible to obtain credit (study), reimbursement (construction), or federal assumption of O&M, provided legislated criteria are met under 33 USC 2231, 33 USC 2232, and 33 USC 408.

(1) *Studies of water resources development projects by non-federal interests.* A non-federal interest may undertake study of harbor improvements. These studies are commonly referred to as Section 203 studies due to the authorizing legislation, Section 203 of WRDA 1986, as amended (33 USC 2231). Guidance pertaining to Section 203 studies is contained in ER 1165-2-209.

(2) *Construction of water resources development projects by non-federal interests.* Sections 204(a)-(g) of WRDA 1986, as amended, provides authority for non-federal construction of harbor and inland harbor projects (33 USC 2232). Guidance pertaining to these studies, commonly referred to as Section 204 studies, is contained in ER 1165-2-504.

(3) *Federal assumption of maintenance.* Section 204(f) of WRDA 1986, as amended, provides the basis and criteria for federal assumption of maintenance of navigation improvements constructed by non-federal interests to federally authorized projects (33 USC 2232). Guidance pertaining to Assumption of Maintenance is found in ER 1165-2-211.

(4) *Section 408 permission applicable to construction of projects by non-federal interests.* Section 204 of WRDA 1986, as amended, authorizes non-federal interests to undertake construction of certain water resources development projects, or separable elements, with potential credit or reimbursement of the federal share of construction, subject to criteria, including obtaining all necessary permits. If the proposed work under Section 204 would alter an existing USACE project, the non-federal interest must obtain Section 408 permission unless the proposed work has been authorized for construction by Congress, or the USACE real estate policies and process applies (33 USC 408). Additional information is in the current USACE policy and procedural guidance for implementing 33 USC 408.

i. Navigation project for general versus restricted interest. When recommending navigation improvements, the Chief of Engineers must determine the general versus special interest in such improvements for the recommendation of appropriate cost sharing. The determination of federal interest requires consideration of the number of properties served by the proposed project and the types of ownerships of such properties (33 USC 2322).

(1) *Single owner.* USACE will not recommend federal cost participation in the construction or expansion of a federal navigation project (or any other type of federal water resources project) where the improvement would only serve (for the foreseeable future) property owned by a single individual, commercial/business enterprise, corporation, or club or association with restrictive membership requirements. A single-owner situation exists when restrictive conditions of any sort permit the single property owner exclusive enjoyment of project benefits. An example of exclusive benefits would be a privately owned port used by several shippers. However, USACE may recommend federal cost participation when the improvement would serve only property owned by a single state, county, municipality, or other duly appointed public entity (33 USC 2322; ER 1165-2-123).

(2) *Initial single, non-public owner.* Federal participation may be recommended in a significant increment of improvement for navigation when the improvement would initially serve property owned by a single individual, commercial/business enterprise, corporation, or club or association with restrictive membership requirements, but a reasonable prospect exists for the improvement to later serve multiple properties with multiple owners. A significant increment is defined as one involving major increases in project length, depth, or width.

(3) *Progressive development.* Progressive development includes nominal, incremental extension (end of the line) situations where part of the improvement is a last project increment serving the last non-public property or property owner. The last property/property owner served may be “at the end” in terms of federal project length, depth, or width, necessitating some project investment in that service alone. This is treated as a multiple-owner situation unless disproportionate incremental investment is required.

j. Project purpose and benefits (coastal storm risk management). Some measures serving navigation may also reduce hurricane and storm damage and vice versa. Measures resulting in increases in net income of commercial navigation activities or in decreases in commercial transportation costs will be evaluated as navigation measures (harbor). Measures to provide for safe and efficient movement of commercial and recreational vessels into and within a harbor and measures to prevent loss or damage to vessels in transit (harbors of refuge) will continue to be evaluated and cost shared as navigation measures (harbor). Measures to prevent wave induced damages to berthed non-commercial (recreational) vessels, and measures to prevent wave damages to docks, piers, slips, and other shoreline facilities not used for commercial navigation, are to be evaluated under the coastal storm risk management (CSRM) provisions of 33 USC 2213(c)(5).

k. Project purpose and benefits (recreation). Navigation projects may produce both recreational navigation outputs such as sport fishing, and commercial navigation outputs such as commercial fishing. The non-federal partner is responsible for 50

percent of the joint and separable costs allocated to recreational navigation (33 USC 2213(c)). Policies regarding recreation planning are in chapter 8.

3–6. Navigation operation and maintenance policies

a. Advanced maintenance. Advanced maintenance dredging, to a specified depth and/or width, may be performed in critical and/or fast-shoaling areas to avoid frequent re-dredging and to ensure the least overall cost of maintaining the project. Before performing advanced maintenance dredging, the integrity of structures adjacent to the channel and the possibility that the material in the advanced maintenance portion of the channel is significantly different from maintenance material must be reviewed (ER 1130-2-520).

(1) *Rock removal.* Advanced maintenance involving the removal of rock is not authorized under the O&M, General appropriation.

(2) *Channel dimensions.* Advanced maintenance cannot be used to provide navigation channel dimensions for vessels that exceed the design limitations of the project.

(3) *Approval of advanced maintenance.* Division Commanders are authorized to approve advanced maintenance dredging for new work dredging and maintenance dredging of the project. Written justification is required and must include a description of historical shoaling rates, frequency of dredging, and a cost analysis.

b. Allowable overdepth. Allowable overdepth dredging or dredging outside the required prism (channel dimensions), is permitted to account for inaccuracies in the dredging process. Districts may dredge a maximum of two feet of allowable overdepth in coastal regions and inland navigation channels. Allowable overdepth more than two feet or the use of zero allowable overdepth requires the prior approval of the Division Commander (ER 1130-2-520).

c. Authorized dimensions. Preauthorization planning reports identify the proposed project dimensions. When project authorization is referenced to such reports, those dimensions constitute limitations with respect to the authorized works. This includes depths, widths, and lengths of channels; harbor maneuvering areas and anchorages; lock sizes; horizontal and vertical bridge clearances; and lengths of breakwaters. Unless specified otherwise, channel depths and widths stated in the project authorization are the dredging limits (exclusive of overdepth and advanced maintenance dredging). the limits are not the drafts and widths of vessels to be accommodated. After the project becomes operational, width increases at the entrances, bends, sidings, and turning places are allowed, as necessary, to provide for the free movement of vessels (33 USC 562).

d. Deeper depth in entrance channel. Increased depths may be provided in entrance channels for the transit of vessels between protected interior channels and the wave action zone (EM 1110-2-1613); the additional depth is cost shared the same as the deepest protected interior channel.

e. Dredged material management. Depending on where the material is placed, the transport and/or discharge of dredged material may fall under the jurisdiction of USACE. Under 33 USC 1413, USACE is the permitting authority for the transport of dredged material for the purpose of ocean disposal. Non-USACE activities that involve the

transport of dredged material for the purpose of ocean disposal require a USACE permit under Section 103.

(1) *Ocean disposal*. USACE conducts Civil Works dredging projects which may include the transport of dredged material for the purpose of ocean disposal. However, USACE does not issue Section 103 permits to itself for such activities. Instead, for USACE Civil Works projects that involve the transport of dredged material for the purpose of ocean disposal, USACE evaluates the activity and applies the USEPA ocean dumping criteria to determine whether disposal of dredged material into the ocean is consistent with the requirements of the Marine Protection, Research and Sanctuaries Act. Section 103 permits and federal projects involving ocean dumping of dredged material are subject to USEPA review and concurrence. USEPA is responsible for designating and managing dredged material disposal areas under the Act. USACE is required to use the designated areas for disposal of dredged sediment to the maximum extent feasible. Where use of a USEPA-designated site is not feasible, USACE may, with concurrence of USEPA, select an alternative site in accordance with the Act.

(2) *Discharge of dredged or fill materials into waters of the United States.* Pursuant to Section 404 of the Clean Water Act (33 USC 1251 et seq.), USACE is the permitting authority for the discharge of dredged or fill material into waters of the United States, which include navigable waters (33 USC 401 and 33 USC 403). Non-USACE activities that involve the discharge of dredged or fill material into waters of the United States require a USACE permit under Section 404. USACE conducts Civil Works projects which may include the discharge of dredged or fill material into waters of the United States. For USACE's Civil Works projects that involve discharges of dredged or fill material into waters of the United States, USACE authorizes its own discharges by applying all applicable substantive legal requirements, in accordance with 33 CFR Part 336, allowing a federally permitted release.

(3) *The Federal Standard.* USACE dredges and places material for capital improvement projects and for O&M of existing projects. The Federal Standard is the least costly dredged material disposal or placement alternative(s) that is consistent with sound engineering practices and meets all federal environmental requirements, including those established under the Section 404 of the Clean Water Act and Section 103 of the Marine Protection, Research and Sanctuaries Act. For dredged material placement, USACE fully considers all practicable and reasonable alternatives on an equal basis, including the use of dredged material beneficially, to identify the Federal Standard (33 CFR Parts 335-338).

(a) Base plan definition. The term "base plan" is an operational description of the Federal Standard because it defines the disposal or placement costs that are assigned to the "navigational purpose" of the project.

(b) Cost sharing. The costs assigned to the navigational purpose of the project are shared with the non-federal partner, the ratio of which is dependent upon the nature and depth of the project.

(4) *Dredged material management plans*.

(a) Dredged material placement capacity. USACE must demonstrate that all federally maintained navigation projects have sufficient dredged material placement capacity for both the construction and maintenance of the project (33 USC 2326b). During a study, the PDT must assess the placement needs of construction and

maintenance of the project. As a matter of policy, the dredged material placement capacity of a project will be designed for a minimum of 20 years, but the PDT must evaluate the operations and maintenance needs for the entire period of analysis.

(b) Five-year plans. Each district with dredged material resources will produce an update on an annual basis to its regional 5-year dredged material management plan. The 5-year plan will be coordinated with state agencies and stakeholders. The plan must identify the expected dredged material budget for each watershed or littoral system, an estimate of the amount of dredged material resources expected to be obtained, identify potential water resource projects that may produce dredged material resources, the suitability of the material for different potential beneficial uses, and identify the potential economic and environmental benefits, efficiencies, and impacts.

(5) *Beneficial use of dredged material.* When establishing the Federal Standard (base plan) for dredged material placement, districts must consider options for beneficial use (33 USC 2238(e)(2)(C)). When beneficial use of dredged material is the base plan (or a part of that plan), the costs for beneficial use are assigned to the navigational purpose of the project and shared with the non-federal partner. However, when beneficial use is not part of the base plan, programmatic authorities may provide for USACE participation (see paragraph 3-7*b*).

(6) *Regional sediment management.* Section 207 of WRDA 1996, as amended, provides authority for USACE to use a regional strategy for managing sediment resources obtained from dredging for construction, operation, or maintenance of an authorized federal navigation project (33 USC 2326). The construction costs of projects implemented following this authority are limited to costs exceeding the Federal Standard.

(7) *Land creation requirements.* Reports proposing land creation, where the lands are necessary for development of port facilities to accommodate traffic, will require the non-federal partner to ensure the lands are retained in public ownership for uses compatible with the authorized purposes of the project. The non-federal partner must regulate the use, growth, and development on such lands for those industries whose activities are dependent upon water transportation.

(8) *Land creation or enhancement at inland harbors.* Federal participation in inland waterway harbor improvements under the Civil Works Program is not warranted when (1) resale or lease of lands used for disposal of excavated material can recover the cost of the improvements, or (2) the acquisition of land outside the navigation servitude is necessary for construction of the improvements and would permit local entities to control access to the project. The latter case is assumed to exist where the proposed improvement consists of a new channel cut into land.

f. Maintained channel depth. Full authorized and constructed project dimensions are maintained for federal navigation projects where feasible and justified. If a temporary reduction in width is acceptable, removal of moderate shoaling along channel lines is deferred until essential dredging in the channel is undertaken. Only where known progressive shoaling along channel lines is unduly restrictive to navigation will its removal be undertaken prior to the normal scheduling of maintenance dredging.

g. Remote and subsistence harbors. Within certain criteria, USACE may construct improvements to a facility that meets the characteristics of a remote and subsistence harbor (33 USC 2242).

(1) *Remote or subsistence harbor definition.* The community served by a remote or subsistence harbor must be at least 70 miles from the nearest surface accessible commercial port; have no direct rail or highway link to another community served by a surface accessible port or harbor; or the project must be located in the States of Hawaii or Alaska, the Commonwealth of Puerto Rico, Guam, the Commonwealth of the Northern Mariana Islands, the United States Virgin Islands, or American Samoa.

(2) *Critical harbor definition.* The harbor must be economically critical such that over 80 percent of the goods transported through the harbor would be consumed within the region served by the harbor and navigation improvements.

(3) *Community viability.* The long-term viability of the community in which the facility is located, or the long-term viability of a community in the region that is served by the project and that will rely on the project, must be threatened without the harbor and navigation improvements (33 USC 2242(a)).

(4) *Benefits.* The PDT will evaluate benefits of the project to public health and safety, access to natural resources for subsistence purposes, local, and regional economic opportunities, welfare of the regional population, and social and cultural value to communities in the region (33 USC 2242(b)). Priority navigation benefits must also be analyzed for all remote and subsistence harbors.

h. Required U.S. Coast Guard coordination. The USCG is responsible for federal ATON and for enforcing or assisting with enforcement of all applicable federal laws on, under, and over the high seas and waters subject to the jurisdiction of the United States (14 USC 102). USACE districts must coordinate directly with the USCG concerning establishment or alteration of ATONs and the regulation of lighterage areas, anchorages, and channels. Coordination must begin early in the study phase and occur throughout all phases of the project to solicit USCG input on ATON implementation requirements and costs and to provide sufficient lead time for USCG budgeting for such (ER 1130-2-520).

i. Sea level change. Potential relative sea level change must be considered in every USACE coastal navigation activity as far inland as the extent of estimated tidal influence (ER 1100-2-8162). Fluvial studies with backwater profiling must also include potential relative sea level change in the starting water surface elevation for such profiles, where appropriate. The project vertical datum must be the latest vertical reference frame of the National Spatial Reference System to be held as constant for tide station comparisons, and a project datum diagram must be prepared (33 USC 562, ER 1110-2-8160, EM 1110-2-6056).

3–7. Special navigation programs

Special navigation program improvements are for specific purposes and may be projects, elements of projects, or USACE activities. Special navigation program activities are initiated and implemented on Congressional authority, specific or continuing. They are typically subject to program or project expenditure limits, with cost sharing as specified in the original authority or as amended.

a. Arctic deep draft navigation studies. The ASA(CW) is authorized to provide technical assistance to non-federal public entities, including Tribes and Native villages, Regional Corporations, or Village Corporations, for the development, construction, and O&M of channels, harbors, and related infrastructure associated with deep draft ports

for the purposes of Arctic development and security needs (33 USC 2243). The authority also allows the Secretary to accept funds provided by non-federal entities, including those described, to carry out the technical assistance. When determining project feasibility, the Secretary may consider national security benefits identified by the Secretary of the department in which the USCG operates, and the Secretary of Defense associated with an Arctic deep draft port to be considered.

b. Beneficial use of dredged material authorities.

(1) USACE is authorized to use federal project construction and operations and maintenance dredged sediments for creating, protecting, and restoring aquatic and wetland habitats (33 USC 2326). Information on implementing this authority is in EP 1105-2-58.

(2) USACE has the authority to modify the structures and operations of an existing federal project to improve the quality of the environment (33 USC 2309a). USACE encourages the use of this authority for implementing projects that use dredged material for aquatic ecosystem restoration. Specific information on implementing this authority is in EP 1105-2-58.

(3) USACE also has the authority to perform a watershed assessment and use dredged material (consistent with WRDA 1986 Section 1135 criteria) to rehabilitate and improve the resiliency of infrastructure and natural resources damaged during a major disaster declared by the President (33 USC 2267b).

(4) Section 216 of the Rivers and Harbors Act of 1970 authorizes USACE to review the operation of a completed project when such is advisable due to significantly changed physical or economic conditions and when the environmental benefits of such projects are beneficial to society (33 USC 549a). This study authority can be used to seek specific Congressional authorization for project modification to use dredged material for aquatic ecosystem restoration. A feasibility study under Section 216 authority is appropriate for large-scale, high-cost restoration projects that exceed the program limits of the Section 204 program.

c. Construction of fishways. When a federal navigation project obstructs fish passage, the Secretary may construct practical and sufficient pathways for fish conveyance (33 USC 608).

d. Small river and harbor improvement projects. 33 USC 577 provides USACE with authority to formulate and construct small recreation and commercial harbor projects without additional project-specific Congressional authorization. Projects implemented under this authority have the same project cost sharing requirements as commercial navigation projects implemented under specific congressional authorization. Specific information on implementing this authority is in EP 1105-2-58.

e. Shore damage prevention or mitigation. 33 USC 426i provides USACE with the authority to address the shore damages caused by federal navigation works on both non-federal public and privately owned shores. Specific information on implementing this authority is in EP 1105-2-58.

f. Drift and debris removal. USACE has authority to undertake projects for the collection and removal of drift and debris from publicly maintained commercial boat harbors and from immediately adjacent land and water areas (33 USC 426m). Congressional authorization, however, is required for projects when the federal cost exceeds the threshold established in law. For the purposes of this program authority,

"drift" includes any buoyant material that when floating in navigable waters of the United States could cause damage to commercial or recreational vessels. "Debris" includes any abandoned or dilapidated structure and any sunken vessel or other object that can reasonably be expected to collapse or otherwise enter navigable waters as drift.

g. Environmental dredging. USACE has authority to conduct environmental dredging of contaminated sediments (33 USC 1272). Where this authority is suggested to remove or remediate contaminated sediments, such removal or remedial action must not be undertaken unless USACE obtains reasonable protection from liabilities, which may arise as the result of the removal or remediation. Such actions will be performed in a manner that:

(1) when possible, identifies all potential responsible parties which contributed to the contaminated sediments being removed or remediated,

(2) documents hazardous substances, as defined in 42 USC 9601(14), that are contained in the contaminated sediments, and

(3) pursues cost recovery or other appropriate actions in conjunction with involved federal and state regulatory agencies to assure the "polluter pays" principles are achieved, when applicable.

h. Modification of bridges that obstruct navigation. Policies and guidelines for the apportionment of bridge alteration costs required for the modification or replacement of an existing highway or rail bridge that causes an unreasonable obstruction to navigation in connection with navigation improvements (33 USC Subchapter II, Alteration of Bridges) are found in USCG regulations at 33 CFR Part 116. See also ER 1165-2-25, Navigation Policy: Apportionment of Bridge Alterations.

i. Offshore wind development. Section 1207 of WRDA 2018 provides authority for the Secretary to identify and study at least three federally authorized ports/harbors that could become innovative ports for offshore wind development.

j. Removal of sunken wrecks and obstructions. USACE may remove sunken vessels and similar objects if determined to be obstructions to navigation (33 USC 414). However, sunken vessels and objects that are not obstructions to navigation but may be nuisances or otherwise undesirable are treated as drift and debris removal.

(1) Primary responsibility for removal belongs to the vessel/object owner, operator, or lessee. If the obstruction is a hazard to navigation and removal is not undertaken promptly and diligently (within 30 days), USACE may obtain a court judgement requiring removal or remove the wreck and seek reimbursement for the full cost of removal and disposal.

(2) Determinations of hazard to navigation and federal marking/removal actions are coordinated with the USCG (ER 1130-2-520).

(3) USACE may remove accumulated snags, obstructions, and other debris located in or adjacent to a federal channel and, for straightening, clearing, and protecting channels in navigable harbors, streams, and tributaries when such work is in the interest of navigation, flood control, or recreation (33 USC 603a).

Chapter 4
Flood Risk Management

4–1. Federal interest

General authority for USACE to participate in FRM projects is provided by Section 1 of the Flood Control Act of 1936 (33 USC 701a), which declared flood control to be a proper federal activity since improvements for flood control purposes are in the interest of the general welfare of the public. The Act stipulates that federal involvement is justified "…if the benefits to whomsoever they may accrue are in excess of the estimated costs, and if the lives and social security of people are otherwise adversely affected." USACE FRM projects are augmented by non-federal partners' floodplain management, emergency response plans, and participation in the federal flood insurance program, and individuals' participation in flood insurance and other protective measures to manage long-term flood risks and support resilient communities. FRM authorities are applicable to inland flooding not related to CSRM events.

a. Level of risk reduction. There is no minimum level of risk reduction, performance, or size required for USACE projects. Typically, the smaller in size of the project or the higher likelihood of capacity exceedance of the project, the higher the residual risk. Therefore, residual risk must be carefully analyzed, documented, and communicated, so that the non-federal partner, business owners, individuals, and other stakeholders can take complementary risk management actions.

b. Major drainage. Drainage projects are usually undertaken in rural areas to increase agricultural outputs. Some portions of drainage improvements may be considered FRM measures (33 USC 701a-1). The typical drainage system consists of drainage ditches, dikes, and related work. An outlet structure is provided at the downstream end where the system empties into a larger channel. The federal interest in these projects is normally limited to the outlet works. Drainage in urban areas can also qualify under 33 USC 701a-1 if the major outlet works do not substitute for works that are a local responsibility, such as municipal storm sewer improvements. Refer to ER 1165-2-21 and paragraph 4-7*i* for additional information.

c. Groundwater. Section 403 of WRDA 1986 (33 USC 701a-1) expands the definition of flood control to include flood prevention improvements for reduction of groundwater induced damages. Individual cases involving urban groundwater-induced flooding believed to have merit within the general context of traditional FRM must be referred to the Headquarters, Civil Works, Planning and Policy Division prior to implying any USACE interest to potential non-federal partners.

4–2. Planning

USACE conducts FRM studies using a risk-informed planning process. The analytical risk framework captures and quantifies the extent of the risk and uncertainty and enables quantified trade-offs between benefits, risks, and cost. Decision making considers explicitly what is gained and what is lost. Projects are analyzed and described in terms of their levels of performance, not in terms of levels of protection. Contingencies are acknowledged, and residual risk is not routinely reduced by overbuilding. Refer to ER 1105-2-101 and EM 1110-2-1619 for procedural details.

a. Climate change or climate variability. Studies must assess the climate change effects in the study area, particularly those that result from the changing frequency and intensity of storms and floods.

b. Existing dam or levee. One goal of planning studies that include an existing dam or existing levee systems is to achieve all four tolerable risk guidelines, as described in ER 1110-2-1156, through the formulation, recommendation, and implementation of cost-effective plans that reduce the risk posed by the infrastructure. The PDT will include specific objectives regarding achieving tolerable risk guidelines when existing dams and levees are in the study area. The extent to which tolerable risk guidelines objectives can be met will vary based on the conditions in the study area and the efficacy and effectiveness of the measures that contribute to meeting the objectives.

c. Standard planning assumptions – without-project condition. PDTs will use the following assumptions for FRM studies. Deviations from the assumptions require vertical team engagement and alignment.

(1) Existing FRM measures and features are in place and are being maintained as required. The PDT's evaluation will consider the actual remaining economic life and performance of existing structures (the age, condition, and efficacy) in the future without-project condition.

(2) Authorized but not yet constructed FRM projects with a high likelihood of construction are in place. A high likelihood of construction is assumed when there is not significant public controversy or risk of litigation that would preclude implementation of the project.

(3) The adoption and enforcement of land use regulations that meet the requirements of federal floodplain management and flood insurance programs (33 USC 701b-12 and 42 USC Chapter 50). PDTs will assume the local or state emergency management or evacuation issuing authority has an adequate plan in place to identify hazards and issue evacuation orders (voluntary or mandatory) and has a plan in place to aid vulnerable populations in evacuating for those events where warning time allows for such emergency action.

(4) Communities in the floodplain participate in the National Flood Insurance Program (NFIP) administered by the Federal Emergency Management Agency (FEMA).

(5) Compliance (by all entities) with Executive Order (EO) 11990, Protection of Wetlands.

d. Standard planning assumptions – with-project condition. The same assumptions that underlie the without-project condition apply to the with-project condition.

4–3. Plan formulation

In addition to the requirements in chapter 1 and chapter 2 of this regulation, PDTs apply the following policies to their plan formulation activities:

a. PDTs will formulate plans to reduce risk to existing development, which may include vacant property that is interspersed with existing development.

b. PDTs must consider structural and nonstructural measures and NNBF, alone and in combination (33 USC 701b-11, 33 USC 2289).

c. PDTs must identify at least one source of government-supplied material capable of providing the quantity of material needed for any proposed earthen FRM measure.

d. PDTs must formulate and consider at least one alternative composed of primarily nonstructural measures (33 USC 701b-11). This alternative must be included in the final array and, and it serves as the alternative to the proposed action in the floodplain required by EO 11988 (ER 1165-2-26).

e. PDTs must include measures or plans to address the contributors of risk to life safety, including identifying measures deemed outside the federal project that reduce or manage life risk, in studies where risks to life safety are identified in the problems, opportunities, or planning objectives.

f. PDTs must identify at least one alternative that would meet tolerable risk guidelines 1 (Understanding the Risk) and tolerable risk guidelines 4 (Actions to Reduce Risk) when the study includes modifying, or addressing flood risk associated with, existing levees or dams. If the tolerable risk guidelines are not met, PDTs must describe the factors contributing to the remaining risk and whether improvements can be made to the formulated plans to achieve tolerable risk guidelines.

4–4. Flood risk management evaluation policies

The evaluation policies in the following paragraphs are a summary of the overall requirements and procedures. More detailed guidance is in Appendix E of ER 1105-2-100.

a. Economic values – costs. The economic costs of FRM projects include LERRD; pre-construction engineering and design; construction elements and management; fish and wildlife mitigation; cultural mitigation; project cost contingency; interest accrued during construction; OMRR&R; and associated lifecycle costs. Certain relocation benefit payments are excluded from the benefit-cost analysis.

b. Comprehensive benefits. Benefit categories encompass economic (national and regional), environmental (national and regional), and social considerations. Economic, social, and environmental benefits, impacts and costs are to be identified, measured, and/or qualitatively characterized using the four P&G accounts.

c. Economics values – national benefits. Benefits from plans for reducing flood hazards accrue primarily through the reduction in actual or potential damages to affected land uses. There are three primary benefit categories that reflect three different responses to a flood hazard reduction plan: inundation reduction, intensification, and location. Flood damages are classified as physical or non-physical damages and one or both classes may result from flooding. PDTs must exclude from the damage calculations any properties built in the 100-year floodplain after July 1, 1991, in violation of certain provisions of local floodplain ordinances. In counties where 50 percent of the land is in the 100-year floodplain, under certain circumstances, the 10-year floodplain may be used in lieu of the 100-year floodplain (33 USC 2318).

d. Physical damages. Physical damages occur to residential, commercial, industrial, institutional, and public property. Damages occur to buildings, contents within buildings, automobiles, and outside property and landscaping. Physical damages also include the costs to repair roads, bridges, sewers, power lines, and other infrastructure components and the value of uncompensated hours for cleanup after the flood.

e. Nonphysical flood losses. Nonphysical flood losses include income losses and emergency costs.

(1) Income losses are the loss of wages or net profits to business over and above physical flood damages that usually result from a disruption of normal activities. Estimates of these losses must be derived from specific independent economic data for the interests and properties affected. Prevention of income losses results in a contribution to NED only to the extent that the losses cannot be compensated for by postponement of an activity or transfer of the activity to other establishments.

(2) Emergency costs are those expenses resulting from a flood that would not otherwise be incurred. Emergency costs must be determined by specific survey or research and may not be estimated by applying arbitrary percentages to the physical damage estimates.

f. Economic values – regional benefits – regional impact analysis. FRM alternative evaluation must include an assessment of the impacts of the construction impacts and the contribution of the project and its reduced flood risk on the regional economy. Regional impacts are measured in regional income, employment, and other measures of the regional economy. The short- and long-term impacts must be evaluated. PDTs must consider the regional economic impacts of flooding on communities impacted by environmental justice concerns, Tribal, and rural communities, including the resilience of the local economy to flood events.

g. Flood risk management social values. Evaluation must consider whether and how measures and alternatives change the risk to life safety in the future, including increases to the potential for life loss, risk transformation, and risk transfer.

h. Loss of life. PDTs must assess potential mortality (life loss) for all alternatives in the final array of alternatives. Where the change is anticipated to be the same across all alternatives or does not play a significant role in the identification of a recommended plan, a qualitative risk assessment will suffice. Refer to ER 1105-2-101 for additional information.

i. Levees and dams. Alternatives that modify existing levees or dams, or propose to construct new levees or dams, must be evaluated using a risk-based approach, as described in ER 1105-2-101 and ER 1110-2-1156.

(1) Special care is required when evaluating the risk imposed by the infrastructure on populations downstream or in the leveed area. This risk is referred to as incremental risk or dam or levee risk. Modifications to dams and levee systems will be supported by evaluations of life safety risks and environmental risks in addition to NED evaluation procedures.

(2) If a study team recommends a new dam, the decision document must include information about the consequences of failure and geologic or other design factors which could contribute to the possible failure of the dam (33 USC 2311). The decision document will also include any design features intended to reduce the likelihood of consequences resulting from failure and will identify any uncertainties that may be reduced by additional studies or investigations. Additional requirements for new dams and modifications to existing dams are in ER 1110-2-1156. Exceptions to any dam safety policy in ER 1165-2-1156, including meeting tolerable risk guidelines, require written concurrence from the Headquarters USACE Dam Safety Officer.

j. Nonstructural benefits. PDTs must calculate nonstructural flood damage reduction benefits using methods like those used to calculate benefits to structural projects and must avoid double counting of benefits (33 USC 2318(b)). Procedural guidance for calculation of nonstructural flood damage reduction benefits is included in Appendix E of ER 1105-2-100.

k. Nonstructural participation rates. Participation in all nonstructural measures is voluntary, except for acquisition, relocation, and permanent evacuation of the floodplain. Participation rates result in uncertainty in the potential economic feasibility of nonstructural measures. A standard or minimum participation rate assumption does not exist, as the characteristics of a community influence its potential participation rate in a USACE nonstructural plan. PDTs must consider participation rates that are appropriate for a community and utilize sensitivity analyses of different participation rates to clearly communicate to decision makers the uncertainty of benefits exceeding costs and plan recommendation. PDTs must describe the assumptions and methodologies used to determine participation rates in the decision document and supporting appendices.

l. Lifecycle costs. When structural alternatives are considered, the decision document must include information about the OMRR&R requirements to sustain structural features over the lifecycle of the project, as well as the trade-offs and considerations relevant to sustaining structural components. Lifecycle cost analysis is a method for assessing the total cost of facility ownership that takes into account all costs of acquiring, owning, and disposing of a structural facility. The reasonably foreseeable disposal options will be evaluated and documented in the recommendation.

m. Residual risk. 33 USC 2282a requires that FRM studies include (1) a calculation of the residual risk of flooding following completion of the proposed project; (2) a calculation of the residual risk of loss of human life and residual risk to human safety following completion of the proposed project; (3) a calculation of any upstream or downstream impacts of the proposed project; and (4) an equitable evaluation of the benefits and costs for structural and nonstructural alternatives.

(1) The analysis must also evaluate the potential for residual risks that are categorized as transferred and transformed risks, defined as, respectively, the change in flood risk in one location due to implementation of risk reduction measures in another location; and the change in nature of the flood risk for a given location associated with the presence of risk reduction measures, such as levees. PDTs must evaluate the potential for transformed and transferred risks in the with-project conditions (refer to ER 1105-2-101 and EM 1110-2-1619 for policy and technical guidance). Mitigation of the residual risk may be necessary and may include the reformulation of alternatives to address projects with high or unacceptable residual risk.

(2) The PDT must evaluate the residual risk over the project service life and communicate the importance of the non-federal partner’s floodplain management plan in managing those risks to preserve the risk reduction the project provides.

(3) Additional guidance on evaluation and display of residual risk is in ER 1105-2-101.

n. Transportation benefits. Flood damage to transportation systems and the resulting transportation delay costs may be an important damage category in many urban settings. PDTs must take care to adequately address transportation delay costs in both the without and with-project condition. However, the USACE FRM mission is not

focused on transportation efficiency. Therefore, transportation efficiency benefits associated with a FRM project must not exceed more than 50 percent of the total benefits required for the economic benefits to exceed the economic costs. If the criterion for participation is met, then all transportation benefits are included in the calculation of the benefit-to-cost ratio.

o. Variables in risk assessment. ER 1105-2-101 identifies key variables that must be explicitly incorporated into the risk-based analysis. At a minimum, the stage-damage function for economic studies (with special emphasis on first floor elevation, and content and structure values for urban studies), discharge associated with exceedance frequency for hydrologic studies, and conveyance roughness and cross-section geometry for hydraulic studies must be incorporated in the risk-based analysis. ER 1105-2-101 further requires a probabilistic display of benefits.

4–5. Project recommendation

a. National Economic Development plan exception considerations. Departures from the NED plan may be considered to manage residual risk, particularly to manage residual life safety risks, or when overriding reasons to recommend another plan are revealed in the analysis of the alternatives. The departure from the NED plan may include uneconomic increments or negative net national economic benefits when non-monetary benefits result from the plan. Any departure from the NED plan requires an exemption from the ASA(CW) except for plans discussed in the following paragraphs.

b. Categorical exception to selection of the National Economic Development plan. If the non-federal partner has identified a desired maximum level of risk management, where the with-project residual risk is not judged as being unreasonably high and net benefits are increasing as the maximum level is reached, the requirement to formulate and evaluate larger scale plans to identify the NED plan is suspended, and USACE may recommend the constrained plan. The PDT is not required to analyze alternative plans providing greater risk reduction than the constrained plan desired by the non-federal partner.

(1) The PDT must analyze enough alternatives to ensure that net benefits do not maximize at a smaller scale, and the recommended (constrained) plan must have greater net benefits than smaller scale plans. If these conditions are met, the recommended plan does not require an exception to policy from the ASA(CW).

(2) If the recommended (constrained) plan includes levels of risk reduction, features, or separable elements that do not produce benefits greater than costs, an exception from the ASA(CW) is required to recommend the constrained plan.

(3) If the NED plan is smaller in physical size or cost than the non-federal partner's LPP, the NED plan must be identified and recommended unless an exception to the NED plan is requested from the ASA(CW).

4–6. Cost sharing requirements

a. Bridges. Alterations to bridges and bridge relocations (removal and replacement) necessitated by an FRM project (regardless of whether the bridge itself causes or contributes to the flooding problem) are project features that are considered as part of LERR and are a non-federal responsibility. However, if in the process of doing work in the channel, either reinforcement, underpinning, or construction is required to

ensure the structural integrity of the bridge, these costs are considered construction costs rather than LERR costs and subject to standard cost sharing. Necessary railroad bridge alterations may be included at federal expense (33 USC 701p). USACE districts must coordinate directly with the USCG concerning establishment of bridges. Refer to Appendix E of ER 1105-2-100 for specific cost sharing considerations for bridge modifications.

b. Additional requirements. Additional procedures for cost sharing are in Appendix E of ER 1105-2-100.

c. Federal project development by non-federal interests. Non-federal interests may undertake work on a water resources development project for which they may be eligible to obtain credit (study), reimbursement (construction), or federal assumption of O&M, provided legislated criteria are met under 33 USC 2231 and 33 USC 2232.

(1) *Studies of water resources development projects by non-federal interests.* A non-federal interest may undertake a feasibility study of proposed water resources projects for submission to the Secretary of the Army. These studies are commonly referred to as Section 203 studies due to the authorizing legislation, Section 203 of WRDA 1986, as amended (33 USC 2231). Guidance pertaining to Section 203 studies is contained in ER 1165-2-209.

(2) *Construction of water resources development projects by non-federal interests.* Sections 204(a)-(g) of WRDA 1986, as amended, provides authority for non-federal construction of certain water resources projects (33 USC 2232). Guidance pertaining to these studies, commonly referred to as Section 204 studies, is contained in ER 1165-2-504.

4–7. Flood risk management policies

a. Agricultural flood risk reduction. USACE FRM programs apply to agricultural and aquaculture flood damages. However, The Food Security Act of 1985 (Public Law 99-198), as amended by the Federal Agriculture Improvement and Reform Act of 1996 (Public Law 104-127), contains so-called “Swampbuster” provisions (affecting conversion of wetlands) that may be triggered with carrying out a FRM project.

b. Acquisitions, relocations, and permanent evacuations.

(1) To have a complete plan, the ability of the non-federal partner to use eminent domain must be retained and is a condition of an implementable project. A 100 percent voluntary participation plan for acquisition, relocation, and permanent evacuation is not considered a complete plan and is not acceptable for USACE participation. The outcome of a non-federal partner refusing to use eminent domain may result in study termination, the recommendation of a LPP, or another outcome potentially requiring a policy exemption from the ASA(CW). Discussions need to be elevated to the vertical team to determine the path forward. Costs for acquisition or permanent relocation of structures will include the provision of relocation assistance under Public Law 91-646 (42 USC Chapter 61).

(2) Alternative use of land is an integral part in planning for acquisition or permanent relocations of structures. USACE policy allows for inclusion of aquatic ecosystem restoration and recreation benefits when justifying permanent relocations or evacuations. Further, unlike structural alternatives, incrementally justified recreation use in conjunction with permanent relocations or evacuations may account for more than 50

percent of project justification. All permanent acquisition or relocation or evacuation recommendations must give proper consideration and documentation to alternative use of land.

c. Executive Order 11988. EO 11988 was issued in 1977 with the intent to avoid additional floodplain development, reduce hazards and risk associated with floods, and restore and preserve natural floodplain values. Natural floodplain values are reflected in the ecosystem goods and services provided by the undeveloped or restored floodplain, including moderation of floods, ground water recharge, compatible recreation, and natural habitat.

(1) ER 1165-2-26 describes the required 8-step EO 11988 process, which aligns with USACE's planning process, and additional USACE policy for proposed actions in the floodplain. Planning reports must document compliance with the 8-step process. The EO does not establish a minimum performance level for USACE FRM projects. Project features, sizing, and scale are formulated and evaluated following the procedures and policies in this planning regulation and ER 1105-2-101.

(2) EO 13690 amends and modifies EO 11988. EO 13690 established Federal flood risk management standards that include resiliency and effects to climate change and climate variability for projects and provide a process for further soliciting and considering stakeholder input. Guidance for implementing EO 13690 is forthcoming, and ER 1165-2-26 remains in effect.

d. Federal Emergency Management Agency coordination and National Flood Insurance Program requirements. FRM projects can impact what is required of a local community for participation in the NFIP. As USACE conducts a project study, early and frequent communication with FEMA on the requirements of the NFIP and the impacts of those requirements on the proposed project should occur. The June 2012 Joint Memorandum, Subject: Federal Emergency Management Agency (FEMA) and U.S. Army Corps of Engineers (USACE) Joint Actions for Planning on Flood Risk Management Projects, addresses the requirement to perform mitigation when proposed USACE FRM projects increase the one-percent annual chance exceedance flood, referred to as the base flood elevation (BFE).

(1) Communities participating in an FRM project with USACE are required to participate in FEMA's NFIP and to comply with the land use requirements of that program (33 USC 701b-12).

(2) NFIP regulations (44 CFR 65.12) require revisions to flood insurance rate maps to reflect BFE and/or floodway changes caused by encroachments permitted by an NFIP participating community.

(3) Once the area subject to map revision to the official FEMA flood map has been defined, the community must demonstrate that no structures are impacted by the increase to the BFE.

(4) In the cases where there is a map revision and impacts to structures, USACE and the non-federal partner can anticipate the extent of necessary mitigation, and consequently, the associated project costs. It is the NFIP participating community's responsibility to submit a Conditional Letter of Map Revision prior to construction of the FRM project.

e. Floodplain management plan requirement. Communities participating in a FRM project with USACE must prepare a floodplain management plan designed to reduce

the impact of future flood events in the project area and to manage residual risk once the project is implemented (33 USC 701b-12).

(1) A non-federal partner's floodplain management plan should implement measures, practices, and policies to reduce loss of life, injuries, damages to property and facilities, public expenditures, and other adverse impacts associated with flooding, and to preserve and enhance natural floodplain values and should also address measures which will help preserve levels of performance provided by the USACE FRM project. In addition, emergency action plans are a vital part of managing residual risk and should be included in the non-federal partner's floodplain management plan in all recommendations where dams and levee systems are part of the project.

(2) The non-federal partner will be encouraged to prepare its floodplain management plan concurrently with the feasibility study to ensure compatibility with the decision-making process and use the public involvement process to obtain public input. While costs for the preparation of the plan are the responsibility of the non-federal partner, data collected during the planning process may be used in development of the plan.

(3) The floodplain management plan must be adopted within one year after signing a project partnership agreement and must be implemented by the non-federal partner not more than one year after the construction of a project.

f. Induced flooding. When a project results in transferring risk by increasing damages within or outside the immediate project area, risk reduction should be investigated and recommended, if cost effective and appropriate. Reduction of induced flooding may be appropriate when the benefits exceed the costs or there are overriding reasons of public safety, economic, or social concerns, or a determination of a real estate taking (such as a flowage easement) has been made. PDTs will account for remaining induced damages in the economic analysis, and the impacts of induced damages must be displayed and discussed in the report.

g. Interior drainage. When a levee restricts interior drainage, a federal project may include features, such as ponding areas, pumping, or gravity outlets, beyond the minimum facilities to address interior damages to the extent that these features produce benefits in excess of costs. Refer to EM 1110-2-1413 for further information on minimum facilities.

h. Land development and floodplain management. Projects or separable increments producing primarily land development opportunities do not reduce existing flood damages, and therefore, will not be recommended for federal participation.

i. Minimum flows, minimum drainage area, and urban drainage.

(1) Flooding problems may be addressed under FRM authorities downstream from the point where the flood discharge is greater than 800 cubic feet per second (cfs) for the 10 percent annual chance exceedance flood (one chance in ten of being equaled or exceeded in any given year) under conditions expected to prevail during the period of analysis. Drainage areas which lie entirely within an urban area, and which are less than 1.5 square miles in area, are assumed to lack sufficient discharge to meet the above hydrologic criterion. Urban streams and waterways that receive runoff from land outside the urban area will not be evaluated using this 1.5 square mile drainage area criterion (33 CFR 238).

(2) In areas of hydrologic disparity, exceptions may be granted by the Division Commander. This exception is limited to drainages which limit the 10 percent annual exceedance probability flood to below 800 cfs, but the 1 percent annual exceedance probably flood still exceeds 1800 cfs. Examples of such hydrologic disparities include the presence of extremely pervious soils, natural storage (wetlands) or detention basins, or diversions with limited capacity. Other conditions could also result in a hydrological disparity between the 10- and one-percent annual chance exceedance flood events. See ER 1165-2-21 for more information.

(3) In urban and urbanizing areas, provision of a basic drainage system to collect and convey local runoff is a non-federal responsibility.

j. Single properties. USACE will not participate in structural FRM measures for a single private property. USACE also will not participate in nonstructural FRM measures including NNBFs benefiting a single private property unless the single property risk reduction is part of a larger plan for structural or nonstructural measures benefiting multiple owners collectively. USACE may consider participation in structural and nonstructural FRM measures protecting a single, non-federal, public property. A FRM project that provides benefit to a single federal property is accomplished on a reimbursable basis when requested by the federal property-owning agency. USACE Civil Works funds may be used for risk reduction for a single-federal property if the risk reduction is part of a larger plan for structural and nonstructural measures, benefiting multiple owners collectively.

k. Use of lands cleared under the Federal Emergency Management Agency Hazard Mitigation Grant Program. USACE and FEMA policy, reiterated in a Memorandum of Agreement (MOA) in 2000, prohibits construction of USACE levees (including berms, floodwalls, and dikes) as part of a federal FRM project on lands that have been acquired through FEMA's Hazard Mitigation Grant Program (HMGP), with limited exceptions. Lands acquired through the HMGP are dedicated to open space. The restriction on levee construction generally does not apply to structures designed for aquatic ecosystem preservation, restoration, or enhancement. Structures for these purposes are deemed consistent with the open space use requirements of the HMGP.

Chapter 5
Coastal Storm Risk Management

5–1. Federal interest

Congress has authorized federal participation in the cost of managing risk to the shores and inhabitants of the United States, its territories, and possessions (33 USC 426e and 33 USC 2213). In implementing the CSRM authorities granted by Congress, USACE may provide federal assistance to manage risk to people, infrastructure and associated resources located along the ocean, estuarine and Great Lake coastlines from erosion, waves and inundation due to coastal storms, along with abnormal coastal and lake flooding when such projects serve the public interest. Cyclical tidal action, including high tides or king tides, or effects from elevated water levels due to sea level change that are not the direct result of coastal storms or tsunamis are not eligible for assistance under CSRM authorities, but need to be accounted for in CSRM planning. The program also does not address erosion damages caused by stream flows or vessels.

a. Prior to WRDA 1986, beach fill or beach restoration was frequently considered an erosion control measure, and erosion control was treated as a project output or project purpose. However, since WRDA 1986, erosion control is treated as means to achieve planning objectives related to CSRM, aquatic ecosystem restoration, or recreation (33 USC 426e) and cost shared accordingly.

b. USACE may apply its CSRM authorities to the shores of the Atlantic and Pacific Oceans, the Gulf of Mexico, the Great Lakes, estuaries, and bays directly connected with the aforementioned bodies of water but also connected with the States, the Commonwealth of Puerto Rico, the U.S. Virgin Islands, Guam, American Samoa, and the Commonwealth of the Northern Mariana Islands. The authority extends only that distance inland or upstream where the dominant causes of damage are coastal storms or abnormal ocean tidal action (or Great Lakes or Gulf of Mexico water motion) and wind-generated waves that result from storm events.

5–2. Planning

USACE conducts CSRM studies using a risk-informed analytical framework. The analytical risk framework captures and quantifies the extent of the uncertainty and risk and enables quantified trade-offs between benefits, risks, and cost. Decision making considers explicitly what is gained and what is lost. Projects are analyzed and described in terms of their expected performance, not in terms of levels of protection. Contingencies are acknowledged, and residual risk is not routinely reduced by overbuilding. Refer to ER 1105-2-101 and EM 1110-2-1619 for policy and technical details.

a. Climate change and climate variability. PDTs will consult current climate change guidance and incorporate climate change and climate variability into the decision-making processes. PDTs evaluate sea level change in the future without- and future with- project conditions. All steps of the decision-making process will consider the sensitivity of project outcomes to the rate and impacts of sea level rise. Careful consideration must be given to the period of economic analysis and the planning time horizon when considering the resilience and robustness of infrastructure projects to the timing and severity of future sea level change. Refer to Appendix E of ER 1105-2-100, ER 1100-2-8162, and EP 1100-2-1 for procedural guidance on the incorporation of sea level rise scenarios into coastal storm risk assessments.

b. Standard planning assumptions – without-project condition. PDTs will use the following assumptions for CSRM studies. Deviations from the assumptions require vertical team engagement and alignment.

(1) Existing CSRM measures and features are in place. The PDT’s evaluation will consider the actual remaining economic life and performance of existing structures (the age, condition, and efficacy) in the future without-project condition.

(2) Authorized, but not yet constructed, CSRM management projects with a high likelihood of construction are in place. A high likelihood of construction is assumed when there is not significant legal or public controversy that would preclude implementation of the project.

(3) The adoption and enforcement of land use regulations that meet the requirements of federal floodplain management and flood insurance programs (33 USC 701b-12 and 42 USC Chapter 50).

(4) PDTs will assume the local or state emergency management or evacuation issuing authority has an adequate plan in place to identify hazards and issue evacuation orders (voluntary or mandatory), as well as a plan in place to aid vulnerable populations in evacuating for those events where warning time allows for such emergency action.

c. Participation in the National Flood Insurance Program. Communities in the floodplain participate in the NFIP administered by FEMA.

d. Standard planning assumptions – with-project condition. The same assumptions that underlie the without-project condition apply to the with-project condition.

5–3. Plan formulation

In addition to the requirements in chapters 1 and 2 of this regulation, PDTs apply the following policies to their plan formulation activities.

a. PDTs will formulate plans to reduce risk to existing development and may include vacant property that is interspersed with existing development. Managing risk to, or erosion to, undeveloped lands is not a high priority.

b. PDTs must consider structural and nonstructural measures and NNBF, alone and in combination (33 USC 2289).

c. PDTs must consider the beneficial use of dredged material, alone or in combination with other measures.

d. PDTs must identify at least one source of the government supplied material capable of providing the quantity of material needed for any proposed earthen coastal storm risk measure. Contractor furnished borrow will be evaluated on a case-by-case basis. Any consideration of establishing a project wide contractor furnished borrow program requires ASA(CW) approval.

e. PDTs must include measures or plans to address the contributors of risk to life safety, including identifying measures deemed outside the federal project that reduce or manage life risk, in studies where risks to life safety are identified in the problems, opportunities, or planning objectives.

f. PDTs must identify at least one alternative that would meet tolerable risk guidelines 1 (Understanding the Risk) and tolerable risk guidelines 4 (Actions to Reduce Risk) when the study includes modifying, or addressing coastal risk associated with existing coastal levees. If the tolerable risk guidelines are not met, PDTs must describe the factors contributing to the remaining risk and whether improvements can be made to the formulated plans to achieve the tolerable risk guidelines.

g. PDTs must consider the mix of capital investment and disposal to sustain and terminate the lifecycle of structural components and include methods to be employed to achieve both measures (OMRR&R).

h. Single purpose CSRM projects are formulated to manage the negative consequences of coastal storms. Recreation is an incidental output of single purpose CSRM alternatives; there are no separable features or construction costs associated with recreation. Refer to paragraph 5-7*k* and chapter 8 for additional recreation policies.

i. Multipurpose CSRM projects are formulated according to chapter 2 and the mission specific procedures in the Appendix E of ER 1105-2-100.

5–4. Coastal storm risk management evaluation policies

The evaluation policies in the following paragraphs are a summary of the overall requirements and procedures. More detailed guidance is in Appendix E of ER 1105-2-100.

a. Coastal storm risk management life safety. Evaluation must consider whether and how measures and alternatives change the risk to life safety in the future, including increases to the potential for life loss, risk transformation, and risk transfer. PDTs must assess potential mortality (life loss) for all alternatives in the final (focused) array of alternatives. Where the change is anticipated to be the same across all alternatives or does not play a significant role in the identification of a recommended plan, a qualitative risk assessment will suffice. Refer to Appendix E of ER 1105-2-100 for additional information.

b. Comprehensive benefits, impacts and costs. Benefit categories encompass economic (national and regional), environmental (national and regional), and social considerations. Economic, social, and environmental benefits, impacts and costs are to be identified, measured, and/or qualitatively characterized using four Principles and Guidelines accounts.

c. Economic values – costs. The economic costs of CSRM projects include LERRD; pre=construction engineering and design; construction elements and management; fish and wildlife mitigation; cultural mitigation; monitoring and adaptive management; project cost contingency; interest accrued during construction; continued construction (periodic nourishment); OMRR&R; and associated lifecycle costs. Certain relocation benefit payments are excluded from the benefit-cost analysis.

d. Economics values – national benefits. Benefits from plans for managing coastal storm risk accrue primarily through the reduction in actual or potential damages to affected land uses. Damages are due directly to storms and the resultant shoreline erosion. There are three primary benefit categories, reflecting three different responses to a coastal storm damage reduction plan: inundation and wave reduction, intensification, and location. Storm damages are classified as physical and non-physical and one or both classes may result from flooding.

(1) *Physical damages.* Physical damages occur to residential, commercial, industrial, institutional, and public property. Damages occur to buildings, contents within buildings, automobiles, and outside property and landscaping. Physical damages also include the costs to repair roads, bridges, sewers, power lines, and other infrastructure components and the value of uncompensated hours for cleanup after the flood.

(2) *Nonphysical flood losses.* Nonphysical flood losses include income losses and emergency costs. Income losses are the loss of wages or net profits to business over and above physical flood damages that usually result from a disruption of normal activities. Estimates of these losses must be derived from specific independent economic data for the interests and properties affected. Prevention of income losses results in a contribution to NED only to the extent that the losses cannot be compensated for by postponement of an activity or transfer of the activity to other establishments. Emergency costs are those expenses resulting from a flood that would not otherwise be incurred. Emergency costs must be determined by specific survey or research and may not be estimated by applying arbitrary percentages to the physical damage estimates.

e. Economic values – regional (distribution) benefits. CSRM alternative evaluation must include an assessment of the impacts of the construction impacts and the contribution of the project and its reduced coastal storm risk on the regional economy. Regional impacts are measured in regional income, employment, and other measures of the regional economy. The short- and long-term impacts must be evaluated. PDTs should consider the regional economic impacts of coastal storms on communities impacted by environmental justice concerns, Tribal, and rural communities, including the resilience of the local economy to coastal storm events.

f. Levees. Alternatives that modify existing coastal levees, or construct new coastal levees, must be evaluated using a risk-based approach, as described in ER 1105-2-101 and the agency's levee safety guidance. PDTs must take special care in evaluating the risk imposed by the infrastructure on populations in the leveed area. This risk is referred to as incremental risk or levee risk. Modifications to levee systems will be supported by evaluations of life safety risks and environmental risks in addition to NED evaluation procedures.

g. Nonstructural participation rates. Participation in nonstructural measures is voluntary, except for acquisition, structure relocation, and permanent evacuation of the floodplain. Participation rate uncertainty results in uncertainty in the potential economic feasibility of nonstructural measures. A standard or minimum participation rate assumption does not exist, as the characteristics of a community influence its potential participation rate in a USACE nonstructural plan. PDTs must consider participation rates that are appropriate for a community and utilize sensitivity analyses of different participation rates to clearly communicate the uncertainty of benefits exceeding costs and impacts to plan recommendation to decision makers. PDTs must describe the assumptions and methodologies used to determine participation rates in the decision document and supporting appendices.

h. Residual risk. The analysis of any proposed CSRM project must include an estimate of the residual risks that remain even after the project is implemented. Residual risk is the expected annual damages and the life safety risks that could occur with the project in place. The analysis must also evaluate the potential for residual risks that are categorized as transferred and transformed risks. The PDT must evaluate the residual risk over the project service life and communicate the importance of the non-federal partner's floodplain management plan in managing those risks. Additional policy on residual risk is in ER 1105-2-101.

i. Transportation benefits. Coastal storm risk to transportation systems and any resulting transportation delay costs may be an important damage category in many coastal settings. PDTs must adequately address transportation delay costs in both the without and with-project condition. However, the CSRM mission focuses on coastal storm damage reduction and not transportation efficiency. Therefore, transportation efficiency benefits associated with inundation that does not damage infrastructure, but only makes it temporarily impassable are generally not considered storm damage and should be treated as incidental benefits. If treated as incidental benefits, these must not exceed more than 50 percent of the total benefits required for the economic benefits to exceed the economic costs. If the criterion for participation is met, then all transportation benefits are included in the calculation of the benefit-to-cost ratio.

j. Variables in risk assessments. ER 1105-2-101 identifies key variables that must be explicitly incorporated into the risk-based analysis. ER 1105-2-101 further requires a probabilistic display of benefits. PDTs must evaluate the potential for transformed and transferred risks in the with-project conditions. Refer to ER 1105-2-101 for guidance.

5–5. Project recommendation

a. Coastal Barrier Resources Act. Project recommendations must be compliant with the Coastal Barrier Resources Act (16 USC 3501-3510).

b. NED exception considerations. Departures from the NED plan may be considered to manage residual risk or when overriding reasons to recommend another plan are revealed in the analysis of the alternatives.

c. Periodic nourishment. Federal participation in periodic nourishment may be recommended to continue for the lesser of (1) project economic life; (2) physical life of structural features required for the project; or (3) 50 years.

5–6. Cost sharing requirements

Additional procedures for implementing cost sharing are in chapter 2 and Appendix E of ER 1105-2-100.

a. Recreational value. Improvements to enhance the recreational value of CSRM projects, such as bathhouses, access roads, toilet facilities, and parking areas, are a local responsibility. Provision of those facilities is not eligible for federal assistance through USACE programs, and costs for those facilities are not ordinarily included as project costs.

b. Periodic nourishment. When the Chief of Engineers determines that the most suitable and economical remedial measures would be provided by a periodic nourishment project, the Chief of Engineers may consider the periodic nourishment as continuing construction for the length of time that the Chief of Engineers specifies (33 USC 426e).

(1) *Continuing construction classification with periodic nourishment.* Classifying the periodic nourishment as continuing construction establishes the federal interest in cost sharing renourishments, usually for the economic life of the project. Federal assistance for periodic nourishment is authorized on the same basis as new construction.

(2) *Continuing construction classification with periodic nourishment and structures.* If the recommended plan for a CSRM project includes a combination of structures and periodic nourishment, the renourishments may be considered continuing construction while future costs needed to operate, maintain, repair, rehabilitate or replace the structural components are considered O&M, which is a non-federal responsibility.

c. Federal project development by non-federal interests. Non-federal interests may undertake work on a water resources development project for which they may be eligible to obtain credit (study), reimbursement (construction), or federal assumption of O&M, provided legislated criteria are met under 33 USC 2231 and 33 USC 2232.

(1) *Studies of water resources development projects by non-federal interests.* A non-federal interest may undertake a feasibility study of proposed water resources projects for submission to the Secretary of the Army. These studies are commonly referred to as Section 203 studies due to the authorizing legislation, Section 203 of

WRDA 1986, as amended (33 USC 2231). Policy pertaining to Section 203 studies is contained in ER 1165-2-209.

(2) *Construction of water resources development projects by non-federal interests.* Sections 204(a)-(g) of WRDA 1986, as amended, provides authority for non-federal construction of certain water resources projects (33 USC 2232). Policy pertaining to these studies, commonly referred to as Section 204 studies, is contained in ER 1165-2-504.

5–7. Coastal storm risk management policies

a. Acquisitions, relocations, and permanent evacuations. Specific policies for CSRM are presented in more detail in EP 1105-2-63.

(1) *Eminent domain.* To have a complete plan, the ability of the non-federal partner to use eminent domain must be retained and is a condition of an implementable project. A 100 percent voluntary participation plan for acquisition, structure relocation, and permanent evacuation is not considered a complete plan and is not acceptable for USACE participation. The outcome of a non-federal partner refusing to use eminent domain may vary from study termination to recommendation of a LPP to another outcome potentially requiring a policy exemption from the ASA(CW). These discussions must be elevated to the vertical team to determine the path forward. Costs for acquisition or permanent relocation of structures will include the provision of relocation assistance under Public Law 91-646 (42 USC Chapter 61).

(2) *Alternative use of land.* Alternative use of land is an integral part in planning for acquisition or permanent relocations of structures. USACE policy allows for inclusion of aquatic ecosystem restoration and recreation benefits when justifying permanent relocations or evacuations. Further, incrementally justified recreation use in conjunction with permanent relocations or evacuations may account for more than 50 percent of project justification. All permanent acquisition or relocation and permanent evacuation recommendations must give proper consideration and documentation to alternative use of land.

b. Coastal zone management plans. To the maximum extent practicable, project alternative and recommendations must be consistent with approved State Coastal Zone Management Programs developed under the authority of the Coastal Zone Management Act of 1972, as amended (16 USC 1451 et seq.). Refer to EP 1105-2-60 for procedural guidance.

c. Dredged material disposal or placement. USACE will accomplish construction and maintenance dredging for navigation projects following the policies in chapter 3. If placement of dredged material on a beach or beaches is determined by USACE to be the least costly alternative, then such placement will be considered integral to accomplishment of the navigation project work and not subject to any special non-federal cost sharing requirements even when the placement accomplishes CSRM benefits. If CSRM benefits from the on-beach placement are required for project benefits to exceed costs, then the appropriate CSRM cost share will be applied.

d. Executive Order 11988. EO 11988 was issued in 1977 with the intent to avoid additional floodplain development, reduce hazards and risk associated with floods, and restore and preserve natural floodplain values. Natural floodplain values are reflected in the ecosystem goods and services provided by the undeveloped or restored floodplain,

including moderation of floods, ground water recharge, compatible recreation, and natural habitat.

(1) *Execution of Executive Order 11988.* ER 1165-2-26 describes the required 8-step EO 11988 process, which aligns with USACE's planning process, and additional USACE policy for proposed actions in the floodplain. Planning reports must document compliance with the 8-step process.

(2) *Minimum performance level.* EO 11988 does not establish a minimum performance level for USACE CSRM projects. Project features, sizing, and scale are formulated and evaluated following the procedures and policies in this regulation and ER 1105-2-101.

e. Federal flood risk management standards. EO 13690 amends and modifies EO 11988. EO 13690 established federal FRM standards that include resiliency and effects to climate change and climate variability for projects and provides a process for further soliciting and considering stakeholder input. Guidance for implementing EO 13690 is forthcoming, and ER 1165-2-26 remains in effect.

f. Floodplain management plan requirement. Communities participating in a CSRM project with USACE must prepare a floodplain management plan designed to reduce the impact of future flood events in the project area and to manage residual risk once the project is implemented (33 USC 701b-12).

(1) *Non-federal partner's floodplain management plan.* A non-federal partner's floodplain management plan should implement measures, practices, and policies to reduce loss of life, injuries, damages to property and facilities, public expenditures, and other adverse impacts associated with flooding, as well as preserve and enhance natural floodplain values. The plan should also address measures which will help preserve levels of performance provided by the CSRM project.

(2) *Development of floodplain management plan.* The non-federal partner will be encouraged to prepare its plan concurrently with the feasibility study to ensure compatibility with the decision-making process. While costs for the preparation of the floodplain management plan are the responsibility of the non-federal partner, data collected during the planning process may be used in development of the plan. Concurrent preparation of the floodplain management plan by the non-federal partner during the feasibility study provides the partner an opportunity to use the public involvement process to obtain public input in the development of its plan.

(3) *Local adoption of floodplain management plan.* The floodplain management plan must be adopted within one year after signing a project partnership agreement and the floodplain management plan must be implemented by the non-federal partner not more than one year after the construction of a project.

g. Historic shoreline. Existing authority provides for extending a beach beyond its historic shoreline only when the extension is desirable for engineering reasons (that is, to provide protection from erosion or as otherwise specifically authorized under public law), is environmentally acceptable, and is an economically justified means to prevent or reduce storm damage behind the historic shoreline. In the case of multipurpose projects that include aquatic ecosystem restoration as a project purpose, extending a beach beyond its historic shoreline is acceptable if it is environmentally justified.

h. National Flood Insurance Program participation requirement. Communities participating in a CSRM project with USACE are required to participate in FEMA's NFIP and to comply with the land use requirements of that program (33 USC 701b-12).

i. Outer Continental Shelf mineral resources. If mineral resources from the outer continental shelf are proposed for use in Civil Works projects, USACE and the Bureau of Ocean Energy Management (U.S. Department of Interior) must enter into an MOA. The non-federal partner must also negotiate a noncompetitive lease with the Bureau of Ocean Energy Management. State and local government agencies, in addition to federal agencies, are exempt from the assessment of fees for the use of outer continental shelf sand, gravel, and shell resources in a shore protection, beach restoration, or coastal wetlands project or program, or in any other construction project funded or authorized by the Federal Government (43 USC 1337(k)(2)).

j. Private property benefits. Benefits to private property are permitted only if such benefit is incidental to the protection of public areas, or if the protection of private property would result in public benefits. USACE will not pursue federal participation in the protection of privately owned, undeveloped shores. USACE will not participate in a coastal storm risk management project consisting solely of land loss prevention where no buildings or facilities are subject to damage. One exception for recommending cost-shared work on private undeveloped properties would be a case wherein the lands in question involve only a minor, but integral part of the overall project, and are necessary for the project to function. Another exemption may be a case where the benefits are derived from developed properties landward of the shorefront parcels, and any benefits to the vacant parcels are incidental. In cases where individual, privately-owned, undeveloped shores are included in a recommendation, there must be analysis to support a finding of inclusion.

k. Public use. Public use is a condition for federal participation in a CSRM project. It is intended that beaches receiving public federal aid cannot provide exclusively private benefits; and therefore, whenever a CSRM project involves beach improvements, public ownership and use of the beach is required (33 USC 2213 and 33 USC 426e(d)).

(1) *Items related to public use fees.* Reasonable beach recreation use fees are allowable when used to offset the non-federal partner share of project costs. Questions about what constitutes reasonable use fees must be discussed with the vertical team and elevated to Headquarters Planning and Policy Division through the appropriate Regional Integration Team, as necessary. Questions about what constitutes reasonable use fees must be discussed with the vertical team and elevated to Headquarters, Headquarters Civil Works Planning and Policy Division through the appropriate Regional Integration Team, as necessary.

(2) *Parking*. Lack of parking may constitute a restriction on public access and use. Therefore, eligibility for federal participation is precluded in areas where there is a lack of sufficient parking facilities provided for the public (including nonresident users) reasonably near and accessible to the project beaches. In some instances, non-federal plans may encourage or direct substitution of reasonable public transportation access or alternative transportation for private automobile access. Questions about what constitutes sufficient parking facilities should be discussed with the vertical team and

elevated to Headquarters Civil Works Planning and Policy Division through the appropriate Regional Integration Team, as necessary.

(3) *Access*. USACE participation is conditioned on provision of reasonable public access rights-of-way, consistent with attendance (demand) used in benefit evaluation and local recreational use objectives.

(4) *Beach use by private organizations.* Federal aid to private shores owned by beach clubs and hotels which limit beach use to members or guests is contrary to the intent of Public Law 826 of 1956 (33 USC 426e(d)).

(5) *Public shores with limitations.* Publicly owned beaches that limit use to residents of the community, or a group of communities, are not considered to be open to the general public and are treated as private beaches.

(6) *Privately owned shores.* All costs for benefits to privately owned shores or land loss prevention must be assigned to the non-federal partner (33 USC 2213).

l. Recreation. Because recreation is considered incidental to the primary project purpose in single purpose CSRM studies, achieving recreation benefits will require no separable construction cost. Recreation benefits may not be more than 50 percent of the total benefits required for economic benefits to exceed economic costs. The recreation benefits limited by this requirement are defined as limited recreation benefits. It is appropriate to include these limited recreation benefits in the economic analysis when selecting the plan that maximizes NED benefits. If the criterion for USACE participation is met and the project can be economically justified with at least half the NED benefits attributable to risk management, then all recreation benefits are included in the benefit to cost analysis. However, costs incurred for other than the risk management purpose, for example to satisfy recreation demand, are a 100 percent non-federal responsibility. Refer to paragraph 5-7*a*(2) for special considerations regarding recreational benefits for permanent acquisition or relocation and permanent evacuation. Refer to paragraph 8-4 for additional information on recreational policies.

m. Shore lines owned by federal agencies.

(1) *Other federal agency lands.* Work to provide CSRM to lands under the jurisdiction of another federal agency must be accomplished on a reimbursable basis, upon request from the agency. One exception would be a case wherein the lands in question involve a minor, but integral, part of the overall alignment. In such case, coastal storm risk management would be included at federal cost using Civil Works funds to assure a complete overall project.

(2) *Non-Civil Works lands.* Department of the Army (Non-Civil Works) lands must be accomplished with Military funds, not Civil Works funds. It is inappropriate that projects wholly for coastal storm risk management to military installations compete for funding under the USACE Civil Works Program with studies and projects requested by non-federal partners. However, if the Army lands are a minor part within the project area of a Civil Works study and project, Civil Works funds may be used if including them in the project is more cost effective than excluding them.

n. Extension of periodic nourishment. When the authorized period of federal participation in periodic nourishment at existing projects expires, it may be extended without further Congressional action for a period not to exceed 50 years after the date of initial construction (42 USC 1962d-5f). Reevaluation using current evaluation guidelines and policies is required. Prior to the expiration of the existing periodic nourishment

period the non-federal partner must request the extension and express a willingness to cost share under current cost sharing law and policy (33 USC 2213). This authority does not apply to projects using sand bypassing plants.

o. Nondomestic source material for fill or nourishment. In any case in which the use of fill material for beach nourishment is authorized as part of an authorized water resources development project, USACE will consider acquiring such material by purchase, exchange, or otherwise from nondomestic sources and use such materials for such purposes only if such materials are not available from domestic sources for environmental or economic reasons (33 USC 2299). All nondomestic sources must be approved by the U.S. Department of Agriculture.

Chapter 6
Aquatic Ecosystem Restoration

6–1. Federal interest

General authority for aquatic ecosystem restoration is provided by 33 USC 2213(c)(7), which added the purpose to other cost shared purposes. The foundational authorities for the USACE aquatic ecosystem restoration mission fall into four broad categories: assessment of impacts of constructed Civil Works projects and recommendations for modifications; beneficial use of dredged material; general authority for USACE to restore degraded aquatic ecosystems; and various requirements applicable to all aquatic ecosystem restoration projects. Regional and site-specific ecosystem restoration authorities also exist but are not described in this regulation.

a. Aquatic ecosystem restoration seeks to improve ecosystem structure and function for nationally and regionally significant aquatic and related terrestrial systems. Ecosystem restoration projects should be formulated in an ecosystem context and address causes of degradation. Potential solutions should be identified that contribute to the long-term sustainability and resilience of the system. Restoration opportunities that are associated with wetlands, riparian and floodplain, and other inland and coastal aquatic systems are most appropriate for USACE involvement.

b. The Civil Works aquatic ecosystem restoration mission is distinct from other USACE environmental programs, such as regulatory permitting, Civil Works mitigation, and Military environmental programs.

c. For ecosystem restoration projects, a federal interest determination is supported by considerations of resource significance and national significance. The three sources of significance in chapter 2 (institutional, public, and technical recognition) combined with relative scarcity of the resources, establish the federal interest. Consideration within individual ecosystem restoration projects should include habitat quality and scarcity, special status species and habitats, biodiversity, habitat connectivity, hydrologic character, geomorphic condition, resilience and self-sustainability, and plan recognition. These assessments capture the properties of an ecosystem that combine to make it nationally or regionally significant, regardless of the agency’s proposed actions. While these assessments are made during the planning evaluations of every ecosystem restoration project, each element is not required to establish the significance of an individual project. Federal interest and significance

determination will also consider priority national and international ecosystems, key watersheds, plus contributions to larger international, federal, and multi-state plans.

d. Factors supporting a determination of federal interest in a water resources problem may include multi-state or international watersheds, use by migratory species, nationally designated sites of ecological significance, or federally managed or protected habitats and species. Special consideration may be applicable where USACE has a long-standing role in managing a water resource, where the agency may be especially suited to apply federal engineering capabilities, or in cases where solving a problem may contribute to improvements in multiple USACE mission areas.

6–2. Aquatic ecosystem restoration improvements

A wide range of improvements to ecosystem functions is possible, including, but not limited to, use of dredged material to restore wetlands; restoring floodplain function by reconnecting oxbows to the main channel; providing for more natural channel conditions including restoration of riparian vegetation, pools, and riffles and adding structure; modification of obstructions to fish passage including dam removal; modifications to dams to improve dissolved oxygen levels or temperature downstream to improve ecological conditions; removal of drainage structures and/or levees to restore wetland hydrology; and restoring conditions conducive to native aquatic and riparian vegetation. Invasive species management is a foundational improvement activity that may be cost effective and is often key to special status species and critical habitat recovery. Formulation of alternatives that investigate the beneficial use of dredged material is highly encouraged.

6–3. Planning

The objective of ecosystem restoration is to restore degraded ecosystem structure, function, and dynamic processes to a less degraded, more natural condition. Restored ecosystems should mimic, as closely as possible, conditions which would occur in the area in the absence of human changes to the landscape and hydrology. In urban settings, restoration of self-sustaining habitats that reflect historic conditions may be constrained by the significant large-scale modifications to the natural landscape. However, partial restoration may be possible, with significant and valuable improvements made to degraded ecological resources, including habitat features that support special status species, provide connectivity between natural areas for wildlife corridors, or help increase biodiversity in an area.

a. PDTs will comprehensively examine the problems contributing to ecosystem degradation, and the development of alternative means for their solution. The intent of restoration is to reestablish the attributes of a more naturalistic, functioning, and self-sustaining ecosystem.

b. In aquatic ecosystem restoration studies, plan formulation and evaluation focus on ecosystem structure and function.

c. Indicators of success include the presence of a large variety of native plants and animals, the ability of the area to sustain larger numbers of certain indicator species or more biologically desirable species, and the ability of the restored area to continue to function and produce the desired outputs with minimal continuing human intervention.

6–4. Plan formulation

In addition to the requirements in chapters 1 and 2 of this regulation, PDTs must also include the following measures or alternative plans in their plan formulation activities.

a. PDTs may formulate ecosystem restoration plans for a single purpose project or as part of a multi-purpose project along with other authorized purposes (such as navigation, FRM or CSRM). PDTs must formulate ecosystem restoration alternative plans in terms of their net contributions to increases in ecosystem structure and function. Multipurpose ecosystem restoration plans are formulated according to chapter 2 and the mission-specific procedures.

b. PDTs must consider structural and nonstructural measures and NNBF, alone and in combination (33 USC 701b-11, 33 USC 2289).

c. PDTs must consider the mix of capital investment and disposal to sustain and terminate the lifecycle of structural components and include methods to be employed to achieve both measures (OMRR&R).

6–5. Aquatic ecosystem restoration evaluation policies

The evaluation policies in the following paragraphs are a summary of the overall requirements and procedures. More procedural guidance is in Appendix E of ER 1105-2-100.

a. Comprehensive benefits, impacts and costs. Benefit categories encompass economic (national and regional), environmental (national and regional), and social considerations. Economic, social, and environmental benefits, impacts and costs are to be identified, measured, and/or qualitatively characterized using the four P&G accounts.

b. Cost effectiveness – incremental cost analyses. USACE will use cost effectiveness to identify the least cost solution for each level of environmental output considered. Incremental cost analysis helps to identify and display variations in costs among different increments of restoration measures and alternative plans. Thus, it helps decision makers determine the most desirable level of output relative to costs and other decision criteria. Cost effectiveness and incremental cost analysis must be performed at an appropriate level of detail for each study to identify the most cost-effective plan within the identified constraints.

c. Economic values. In most cases single purpose aquatic ecosystem restoration projects involve basic and limited economic benefit analysis. The primary economic analysis focuses on developing cost information to provide a basis for comparing cost effectiveness among plans. Aquatic ecosystem restoration plans do not need to exhibit NED benefits but are normally based on a combination of monetary and non-monetary benefits and costs.

(1) *Economic values – national benefits.* PDTs will evaluate the incidental economic benefits produced by restoration of the aquatic environment using the methods and procedures for the type of benefit produced. For example, flood damage reduction benefits must be evaluated consistent with the conceptual basis for FRM project economic values.

(2) *Economic values – costs.* The economic costs of aquatic ecosystem restoration projects include LERRD; post-feasibility pre-construction engineering and design; construction elements; construction management; historic properties mitigation;

monitoring and adaptive management; contingency; interest during construction; OMRR&R; and associated lifecycle costs.

(3) *Economic values – regional (distribution) benefits – regional impact analysis.* Aquatic ecosystem restoration alternative evaluation must include an assessment of the construction impacts and the contribution of the project to the regional economy. Regional impacts are measured in regional income, employment, and other measures of the regional economy. The short- and long-term impacts must be evaluated.

d. Ecosystem goods and services. USACE defines ecosystem goods and services as socially valued aspects or outputs of ecosystems that depend on self-regulating or managed ecosystem structures and processes.

e. Environmental benefits. Aquatic ecosystem restoration outputs must be clearly identified and quantified in appropriate units. Although it is possible to evaluate various physical, chemical, and biological parameters that would result in an increase in ecosystem quantity and quality in the project area, units that measure an increase in ecosystem value and productivity are preferred. PDTs may request use of alternate measures of ecosystem value and productivity from USACE Headquarters.

f. Sea level change and climate variability. The planning of aquatic ecosystem restoration projects in and adjacent to coastal zones must consider the potential for future sea level changes. Studies must also assess the climate change effects in the study area, particularly those that result from the changing frequency and intensity of storms and floods. The qualitative analysis will indicate whether benefits would likely increase, decrease, or remain stationary in response to different sea level rise scenarios. To determine whether a quantitative analysis should be completed, USACE will consider the technical limitations of models used for the study, the time and cost to potentially develop additional tools and obtain necessary baseline information, and the risk that any quantitative analysis may result in such significant uncertainty that the results are not reliable to inform or influence any conclusions.

g. Single purpose versus multipurpose plans. PDTs will evaluate single purpose alternative plans in terms of their net contributions to increases in aquatic ecosystem services. Multipurpose plans that include aquatic ecosystem restoration will contribute to economic, environmental, and social outputs. Incidental gains, such as incidental recreation or flood damage reduction, and incidental losses (flood damage reduction or hydropower) associated with the project must also be evaluated.

6–6. Project recommendation

a. A trade-off analysis must be used to determine the recommended plan, including issues related to cost effectiveness and incremental cost, degree of achieving the planning objectives, significance and magnitude of ecological benefits, reasonableness of cost, and other pertinent decision factors. Incremental cost analysis assists in this trade-off analysis but does not drive that process.

b. Aquatic ecosystem restoration projects are justified based on their contribution to restoring the structure or function, or both, of a degraded ecosystem, when considering the cost of the proposal and when benefits are judged in excess of costs. The net benefits may be a combination of monetary and non-monetary benefits.

c. The significance of the outputs is a critical factor in determining if the monetary and non-monetary benefits of the proposed project justify monetary and/or non-

monetary costs. The scarcity of the outputs is also a factor in this determination. The uncertainties and risks associated with achieving the projected outputs must also be considered. See the Appendix E of ER 1105-2-100 for additional information.

d. Recommended ecosystem restoration measures do not need to exhibit net NED benefits but will be based on a combination of monetary and nonmonetary benefits.

6–7. Cost sharing requirements

Cost sharing for ecosystem restoration and protection is prescribed in 33 USC 2213. Additional requirements for cost sharing are in chapter 2 and Appendix E of ER 1105-2-100.

a. If LERRDs exceed the 35 percent non-federal partner cost share, per 33 USC 2213, USACE will reimburse, subject to appropriations, the non-federal partner for the difference. However, with this requirement, the Federal Government may not include the project in the construction budget. The non-federal partner may agree, in writing, to voluntarily waive reimbursement, which could allow the project to be supported in the construction budget. Additionally, the standard project partnership agreement for construction of aquatic ecosystem restoration projects includes language that such reimbursement will not be sought.

b. The OMRR&R costs for aquatic ecosystem restoration projects are a non-federal partner expense. Non-federal partner operations and maintenance begins upon completion of project construction, or each separable element thereof, and is not delayed due to ongoing monitoring or adaptive management actions (Section 1010 of WRRDA 2014, 33 USC 2347a). The responsibility of a non-federal interest for operations and maintenance of the nonstructural and non-mechanical elements of an ecosystem restoration project, or a component of such project, will cease 10 years after the project is determined successful per Section 2039 of WRDA 2007, as amended (33 USC 2330a).

c. Non-federal interests may undertake work on a water resources development project for which they may be eligible to obtain credit (study), reimbursement (construction), or federal assumption of O&M, provided legislated criteria are met under 33 USC 2231 and 33 USC 2232.

(1) A non-federal interest may undertake a feasibility study of proposed water resources projects for submission to the Secretary of the Army. These studies are commonly referred to as Section 203 studies due to the authorizing legislation, Section 203 of WRDA 1986, as amended (33 USC 2231). Guidance pertaining to Section 203 studies is contained in ER 1165-2-209.

(2) Sections 204(a)-(g) of WRDA 1986, as amended, provides authority for non-federal construction of certain water resources projects (33 USC 2232). Guidance pertaining to these studies, commonly referred to as Section 204 studies, is contained in ER 1165-2-504.

6–8. Aquatic ecosystem restoration policies

a. Appropriate locations. In most circumstances, aquatic ecosystem restoration projects will be constructed on lands for which the non-federal partner is able to acquire

project lands in fee title, although in some cases non-standard estates such as easements may be approved.

(1) *Other appropriate locations.* Appropriate locations also include, but should not be limited to, sites influenced by other Civil Works projects, or in designated ecosystems of national significance.

(2) O*ther federal lands.* The USACE may carry out an aquatic ecosystem restoration project on other federal lands, under the jurisdictional of another federal agency. A project may be carried out when the cost of the acquisition of such federal lands has been paid for by the non-federal interest and the non-federal interest has entered into a memorandum of understanding with the other federal agency that includes such terms and conditions as the Secretary determines to be necessary (Sec 1025 of WRRDA 2014; 33 USC 2226).

b. Aquatic ecosystem restoration purpose. Projects implemented under the aquatic ecosystem restoration mission and this regulation must address the restoration of aquatic ecosystems. Projects implemented under the aquatic ecosystem restoration mission should not address the restoration of cultural or historic resources; aesthetic resources; upland ecosystems; features to improve water quality; or cleanup of hazardous and toxic wastes. Projects must not replace another federal, state, or local entities' plans for restoration.

c. Land acquisition. Aquatic ecosystem restoration projects will emphasize improving degraded ecosystem function and structure through application of USACE's engineering and technical expertise, as opposed to projects that primary rely on land acquisition and protection to achieve project benefits. Project proposals that consist primarily of land acquisition are not appropriate. In general, land value should not exceed 25 percent of total project costs. Projects with land costs exceeding this level are not likely to be given a high priority for budgetary purposes (see paragraph 6-7*a*).

d. Mitigation. Aquatic ecosystem restoration projects should be designed to avoid the need for compensatory fish and wildlife mitigation. If mitigation will be required, vertical team coordination and concurrence is required. Projects implemented using aquatic ecosystem restoration authorities may not be used as wetland banks or mitigation credit for the non-federal partner or other USACE projects. Aquatic ecosystem restoration projects should not be used to offset mitigation credit for USACE projects.

e. Monitoring and adaptive management. Aquatic ecosystem restoration projects must include a monitoring and adaptive management plan (also called contingency plan) to determine success of restoration efforts (Section 2039 of WRDA 2007, as amended; 33 USC 2330a). Monitoring includes the systematic collection and analysis of data that provides information useful for assessing project performance and will be used by the USACE in consultation with Tribal, federal, and state resource agencies to guide decisions on operational or structural changes to a project that may be needed to ensure the restoration meets the success criteria. Development of success criteria during the feasibility phase should be done in consideration of long-term ecological monitoring needs. The plan must include criteria for restoration success, the required monitoring activities, and the estimated cost and duration of the monitoring, which is included in the total project cost.

(1) *Monitoring duration.* Monitoring begins upon completion of construction of a project, or a separable element of a project; and continues until success criteria are met. Upon completion USACE will send a construction complete notification to the non-federal partner. The notification will inform the partner to begin OMRR&R regardless of on-going monitoring or adaptive management efforts (Section 1010 of WRRDA 2014, 33 USC 2347a).

(2) *Ecological success.* Ecological success will be documented by the District Engineer in consultation with the Tribal, federal, and state resource agencies, per 33 USC 2330a. Within a period of ten years from completion of construction, monitoring may be cost-shared. Any additional monitoring required beyond ten years will be a non-federal responsibility. The ten years of cost-shared monitoring may be applied separately for separable elements of the project that are completed at different times.

(3) *Corrective action plans.* Corrective actions may be needed if monitoring demonstrates restoration measures are not achieving ecological success criteria. Any corrective actions to be taken, consistent with the monitoring and adaptive management plan or contingency plan, will be concurred with by the non-federal partner and will be cost-shared, even if the need for the corrective action was identified during the time period that the monitoring was a non-federal responsibility. If significant changes to the project are required and cannot be addressed within the contingency plan, coordination with the Chief of Planning and Policy, USACE Headquarters, is required and other authorities may be examined.

(4) *Completion of non-federal partner operation and maintenance requirements.* Ten years after success criteria is met, the non-federal partner is no longer required to conduct operations and maintenance on nonstructural and nonmechanical elements of the restoration project (Section 2039 of WRDA 2007, as amended; 33 USC 2201). Therefore, the sustainability of benefits must be evaluated and documented during the planning phase, and PDTs must include a description of project features that are considered nonstructural and nonmechanical in the decision document. PDTs should coordinate with the vertical team if they have any questions about categorizing specific features.

(5) *Inspection of completed works.* Identification of success criteria for long-term ecological monitoring needs will inform the USACE when conducting future inspection activities under the Inspection of Completed Works program. The results of inspections must be reported as part of the Inspection of Completed Works program, funded in the Operations and Maintenance account.

f. Operation, maintenance, repair, replacement, and rehabilitation. General OMRR&R activities are developed in the feasibility phase, including associated costs. After an ecosystem restoration project (or separable elements thereof) is constructed, the non-federal partner begins OMRR&R of the project following the operations and maintenance manual prepared by USACE at the time of project construction.

(1) *Non-federal costs.* The OMRR&R of an ecosystem restoration project is a non-federal partner responsibility at 100 percent non-federal cost. Monitoring and adaptive management activities are not OMRR&R costs, and those activities may be cost-shared within the time frame described in this chapter.

(2) *Responsibility for periodic inspections of completed works.* USACE maintains responsibility to conduct periodic inspections of completed projects, and non-federal

partners are required to complete semi-annual operation reports. The periodic inspection will determine whether the non-federal partner is performing required maintenance and whether obstructions or encroachments in the project area exist that may reduce or hinder the ecological sustainability of the project. The project's periodic inspections should consider the criteria established in the monitoring and adaptive management or contingency plan to evaluate whether the restoration project continues to function as designed and constructed. .

g. Real estate. Requirements specified in chapter 4 of this regulation apply to aquatic ecosystem restoration studies. Generally, fee title is required for aquatic ecosystem restoration projects. However, a lesser, or easement estate, may be appropriate based on the extent of interest required for the operation or requirements of a project.

h. Recreational features. Project recommendations may include limited recreational features compatible with the ecosystem outputs for which the project is designed. Additional policies regarding recreation planning are in chapter 8.

i. Single owner and public interest. For projects where the land on which most of the physical ecosystem restoration will occur is in the ownership of a single firm, individual, club, or association with restrictive membership requirements, PDTs must demonstrate clearly that the restoration benefits are in the overall public interest and that the benefits do not accrue primarily to the property owner.

j. Water quality. Water quality is an important component of ecosystem structure and function; therefore, water quality improvement may be considered as an output of an ecosystem restoration project. However, projects or features that would result in treating or otherwise abating pollution problems caused by other parties where those parties have, or are likely to have, a legal responsibility for remediation or other compliance responsibility must not be recommended for implementation. The PDT should not formulate water quality outputs but could consider those outputs as part of an LPP or part of a comprehensive benefit component. Project success criteria should not be based upon the monitoring and measurement of water quality.

Chapter 7
Hydroelectric Power Generation

7–1. Federal interest

Congress, through various statutes, directed USACE to consider the development of hydroelectric power in conjunction with other water resources development plans. Current policy calls for USACE to formulate comprehensive plans including the development of hydropower by a non-federal partner. USACE will pursue federal development only where such non-federal activity would be impractical. Even in those cases, all costs associated with development of hydroelectric power at the site of a USACE project are borne by non-federal partners.

7–2. Hydroelectric power generation improvements

a. New federal projects. Hydroelectric power development may be considered during planning for multipurpose projects involving dams and lakes and may be

recommended if non-federal development would be impractical. See chapters 9 and 10 for additional information.

b. Addition of hydropower to existing projects. USACE projects without hydroelectric power facilities may add facilities through Federal Energy Regulatory Commission licensed non-federal development. In rare cases, Congress may authorize federal development. USACE guidance related to 33 USC 408 provides a mechanism for others to alter an existing USACE Civil Works project without seeking reauthorization of the project from Congress.

c. Technical services. Upon request, districts may provide reimbursable technical services to states or state subdivisions on hydropower development at sites where hydropower is not an authorized purpose (Intergovernmental Cooperation Act of 1968, 42 USC 4201-4233). Assistance is limited to technical services. Separate authority to construct or operate and maintain hydropower facilities is required. The USACE Center of Expertise for hydropower projects is the Hydroelectric Design Center (HDC) located in Northwestern Division. Some technical services must be provided by the HDC. Any technical service agreements related to hydropower must be coordinated with HDC.

Chapter 8
Recreation

8–1. Federal interest

USACE is one of the Nation's largest providers of outdoor recreation opportunities. Although known primarily for the opportunities managed at its reservoir projects, USACE also participates in the planning, design, and construction of recreation facilities that are cost shared by the non-federal partner at a wide variety of other types of water resource development projects. Such facilities might include hiking and biking trails associated with a stream channel or levee primarily designed for FRM. There is no general authority for USACE participation in a single purpose recreation project, and USACE will not budget for single purpose recreation projects. USACE will plan for and implement projects serving other purposes, and these may have incidental recreation benefits (see paragraph 8-4).

8–2. Recreation improvements

A list of recreational facilities which may be provided in recreation development USACE projects varies by primary project type and is provided in Appendix E of ER 1105-2-100. USACE does not participate in the development of improvements that provide outputs or services generally considered vendible, including those provided by private businesses and entities. If a non-federal recreation partner cannot be identified, facilities or project modifications will not be recommended unless justified by other project purposes, in which case recreation benefits are considered incidental. Minimum facilities needed to maintain public health or safety are permissible. These are limited to road end turnarounds, guardrails, barricades, warning signs, public safety fencing, and vault toilets unless upgrades are required by federal or state regulations. Boat ramps and trailer parking justified by project operations requirements may be provided.

8–3. Recreation evaluation policies

The measurement standard and conceptual basis for recreation benefits is willingness to pay for each increment of output from a plan. In some planning situations it is infeasible to directly measure willingness to pay, therefore, alternative techniques are used to estimate the total value of a plan's output. The procedures described in the following paragraphs apply to the estimation of benefits used in the economic evaluation of recreation projects.

a. Comprehensive benefits, impacts, and costs. Benefit categories encompass economic (national and regional), environmental (national and regional), and social considerations. Economic, social, and environmental benefits, impacts, and costs are to be identified, measured, and/or qualitatively characterized using the four P&G accounts.

b. Economic values – national benefits. National economic benefits from recreation opportunities created by a project are measured in terms of willingness to pay. Benefits for projects that increase the supply of recreational facilities are measured as the willingness to pay for the increment of supply. Benefits for projects that alter willingness to pay (for example through quality changes) for recreational facilities are measured as the with- and without-project willingness to pay.

c. Evaluation procedure. It is frequently not possible to estimate demand directly from observed price-consumption data for publicly provided recreation. Thus, three alternate methods can be used to estimate use and willingness to pay: the travel cost method (TCM), contingent valuation method, and the unit day value method (UDV). Criteria to select the method to use include availability of a regional demand model, the type of recreation activities affected (general or specialized), estimated annual visits, and cost of proposed facilities. When obtaining the required OMB approvals for methods that require surveys would unnecessarily prolong the duration or cost of a study, the UDV or other simplified approach may be approved for use by Headquarters Civil Works Planning and Policy Division.

(1) *Travel cost method.* TCM consists of deriving a demand curve by using the variable cost of travel and the value of time as proxies for price. This method may be applied to a site-specific study or a regional model.

(2) *Contingent valuation method.* The contingent valuation method estimates national economic benefits by directly asking individual households their willingness to pay for changes in recreation opportunities at a given site. This method may be applied to a site-specific study or a regional model. Contingent value methods must not be used to estimate non-use values, including existence, "option," or bequest values; these methods will not be approved.

(3) *Unit day value.* The UDV method relies on expert or informed opinion and judgment to estimate the average willingness to pay of recreational users. This method may be applied to site-specific studies only. The USACE Economic Guidance Memorandum on UDV is updated annually, for example, Economic Guidance Memorandum 23-03: Unit Day Values for Recreation for Fiscal Year 2023.

8–4. Recreation policies

a. Beach renourishment. USACE will not participate in the addition of sand to a beach solely to increase its potential for recreation. Other associated recreation developments are entirely non-federal responsibilities except on federally owned

shores. The recreation benefit of placing sand on the beach must be incidental to the CSRM purpose.

b. Continuing authorities. Continuing authorities' projects are subject to the same recreation policies and conditions of participation as specifically authorized projects. Additionally, all costs above the statutory limitation of federal expenditures for these projects are entirely a local responsibility.

c. Cost sharing. The non-federal partner is responsible for 50 percent of the joint and separable costs allocated to recreation (33 USC 2213). Recreation areas which were developed prior to implementing the cost sharing principles of the Federal Water Project Recreation Act (Public Law 89-72) continue to be operated directly by USACE. Improvements and repairs to existing USACE management facilities to meet current standards and safety requirements are permitted without cost share.

d. Limitations on USACE participation in recreation projects. Planning and construction of multipurpose projects have historically included recreation facilities that are operated and maintained by USACE. USACE budget policy generally precludes using Civil Works resources to construct new recreation single-purpose projects in the Civil Works Program. Current policy allows for a project that is formulated for other primary purposes and average annual recreation benefits are less than 50 percent of the average annual benefits required for justification (that is, the recreation benefits that are required for justification are less than an amount equal to 50 percent of total project costs).

e. Nonstructural flood or coastal storm risk management projects. The limitation of increased federal cost for recreation development described in paragraph 8-4*d* does not apply to projects formulated for nonstructural FRM or CSRM that include recreation development. Cost of recreation development for nonstructural acquisition or permanent relocations projects may not exceed 50 percent of the total project costs.

f. Non-reservoir flood risk management, aquatic ecosystem restoration, and navigation projects. USACE may participate in recreation facilities at non-reservoir FRM projects if the recreation activities have a strong, direct relationship to the proposed FRM measures, such as trails along the channel or levee right-of-way. USACE participation in these projects is limited by policy, as noted in this regulation. General policies described in the previous paragraphs also apply to non-reservoir projects, with the following exceptions:

(1) Basic recreation facilities that take advantage of project-created opportunities may be provided, but only on lands acquired for non-recreation purposes.

(2) Separable lands acquired for access, parking, and facilities that are required for access, parking, potable water, sanitation, and related developments for health, safety, and public access are eligible for recreation cost sharing.

(3) Generally, if there is no non-federally sponsored recreation development, USACE will not share in minimum facilities costs.

(4) The federal cost of a project including recreation may not exceed the federal cost of the project excluding recreation by more than 10 percent without prior approval by ASA(CW). For unauthorized projects, approval of the ASA(CW) to exceed the 10 percent criterion must be obtained.

(5) Recreation developments may be provided within the lands acquired by non-federal partner for the basic FRM project, except as may be required for access,

parking, potable water, sanitation, and related developments for health, safety, and public access. At local FRM projects, recreation emphasis is on day-use type activities and facilities that capitalize on opportunities for use of public lands in an urban setting.

(6) The inclusion or exclusion of recreation will not influence formulation of the alternatives or recommendation of a plan for FRM, which must attain benefits in excess of cost without regard to recreation. The evaluation of an alternative plan formulated for FRM will include effects on existing recreation and recreation development.

(7) Certain types of recreation facilities, while they may be appropriate to the project, are excluded from federal participation since they are normally provided by private enterprise, and the Federal Government should not compete with, but rather encourage, the provision of such facilities by concessionaires or other entrepreneurs. A list of such facilities and other facilities considered inappropriate for such projects is provided in the Appendix E of ER 1105-2-100.

(8) Grading and paving, to the extent they represent least cost alternatives to stabilizing floodways, may be included in the FRM purpose without regard to whether the graded or paved areas may thereafter be used for recreation activities or facility developments not eligible for inclusion in the federal recreation purpose. Such grading or paving may be done by USACE to specifications more costly than necessary for floodway stabilization provided the additional cost is paid by a non-federal contribution.

g. Recreation at aquatic ecosystem restoration projects. Recreation at ecosystem restoration projects must be compatible with these types of projects and enhance the visitation experience by taking advantage of natural values. The social, cultural, scientific, and educational values must be considered within the framework of the ecosystem restoration project purpose. Recreation facilities may be added to take advantage of the education and recreation potential of the aquatic ecosystem restoration project, but the project will not be formulated for recreation.

(1) Recreation development at an ecosystem restoration project must be ancillary to the primary purpose, appropriate in scope and scale, and must not diminish the ecosystem restoration outputs used to justify the project. The recreation potential may be satisfied only to the extent that recreation does not adversely impact the ecosystem restoration purpose, and the recreation facilities are justified.

(2) The recreational experience must build upon the ecosystem restoration objective and take advantage of the restored resources rather than detract from them. Aquatic ecosystem restoration projects should not encourage public use if there is no non-federal partner willing to cost share recreation.

(3) Federal participation in recreation development at ecosystem restoration projects will be limited to the facilities shown on the list in Appendix E of ER 1105-2-100. Recreation features must not increase the federal cost of the aquatic ecosystem restoration project by more than 10 percent without the approval of the ASA(CW).

Chapter 9
Water Supply Storage

9–1. Federal interest

The Flood Control Act of 1944 (Public Law 78-534); the Water Supply Act of 1958, as amended (43 USC 390b); Section 103 of WRDA 1986, as amended (33 USC 2213);

and Sections 1116, 1118 (43 USC 390b-2), and 1304 of WRDA 2016 (Title I of Public Law 114-322), among other laws, define the federal interest in water supply.

a. These authorities recognize that the primary responsibility for development and management of domestic, municipal and industrial (M&I) water supply, rests with states and local entities. The authorities generally assign the financial burden of including water supply in USACE reservoir projects to water supply users. Other water supply statutes provide for a reduction in price for certain users, for example for low-income communities in 33 USC 2324, or in the case of the six Missouri River mainstem reservoirs the elimination of a price altogether, under Section 1046(c) of WRRDA 2014 (33 USC 2319 note), as amended.

b. Agricultural water supply projects, however, are different in that their construction is cost shared at 65 percent federal expense under Section 103(c)(3) of WRDA 1986 (33 USC 2213).

c. USACE may participate and cooperate in developing water supplies in connection with construction, operation, and modification of federal navigation, FRM, or multipurpose projects. Section 8106(b) of WRDA 2022 (33 USC 2282g) specifies procedures for considering such alternatives at the request of the non-federal partner. Certain conditions of non-federal participation are required. Existing legislation gives USACE authority to make its reservoirs available for surplus water, for domestic, M&I water supply, and for agricultural water supply.

d. USACE is also authorized to provide emergency water and assist states and local interests in their emergency water supply planning process under 33 CFR Part 203.

9–2. Water supply storage improvements

a. Construction and reallocation. The purpose of reservoir water supply storage allocations, whether constructed or reallocated, is to provide assurance to the extent possible of continuation of such supply during periods of drawdown and drought.

(1) *Construction.* USACE is authorized to recommend plans for authorization to construct storage in multipurpose reservoirs for domestic, M&I water supply under the Water Supply Act of 1958 as amended (43 USC 390b), and to construct projects for agricultural water supply under Section 103(c)(3) of WRDA 1986 (33 USC 2213). In addition, the Water Supply Act of 1958 authorizes USACE to include storage in a planned or existing reservoir if such modification would not seriously affect the authorized purposes or involve major structural or operational changes to the reservoir. Some facilities for releasing or withdrawing the stored water can be included in the project structure.

(2) *Reallocation.* The Water Supply Act of 1958 authorizes the ASA(CW) to reallocate storage in planned or existing reservoirs for domestic and M&I water supply. If the reallocation would seriously affect the authorized purposes or involve major structural or operational changes to the reservoir project, Congressional approval is required.

b. Section 6 contracts. Section 6 of the Flood Control Act of 1944 (33 USC 708) authorizes the ASA(CW) to enter into contracts for domestic or industrial uses of surplus water that may be available at USACE reservoir projects.

c. Conservation measures and seasonal operations for water conservation. Inclusion of conservation measures and seasonal operations for water conservation that are consistent with project purposes in either plan formulation or project operations to support water supply may be considered (Sections 1116, 1118, and 1304 of WRDA 2016). The scope of such conservation measures is different from that of reservoir water supply storage allocations, as conservation measures are not independent project purposes and do not provide even conditional assurance for any quantity of water, but their implementation may extend beyond reservoirs to include single purpose FRM projects and locks and dams.

9–3. Planning for reallocation of storage

a. Request. National policy regarding water supply states that the primary responsibility for development and management of water supply rests with states and local entities. Therefore, a request letter from an entity must be received to initiate the process. The Water Management and Reallocation Studies Planning Center of Expertise, acting as the review management organization, determines whether the water needs analysis and modeling is subject to approval for use guidelines. Refer to ER 1165-2-217 for additional information.

b. Authority. The Water Supply Act of 1958 authorizes the ASA(CW) to reallocate storage in planned or existing reservoirs for domestic and M&I water supply use, provided that the reallocation would not seriously affect other authorized purposes or involve major structural or operational changes. A reallocation of storage for a water supply purpose may have effects on other authorized purposes of the reservoir; for each alternative formulated the impacts to other purposes must be calculated. The USACE Chief Counsel opinion of June 25, 2012, entitled “Authority to Provide for Municipal and Industrial Water Supply from the Buford Dam/Lake Lanier Project, Georgia,” interprets major structural or operational changes or serious effects to authorized purposes as actions that would fundamentally depart from Congressional intent for the project; the amount or percent of storage involved is not determinative. Whether impacts have a serious effect on other project purposes or involve major structural or operational changes should be coordinated with Office of Counsel and will be determined on a project-by-project basis.

c. Dam safety. Dam safety must be in the forefront in all decisions regarding water supply storage at USACE reservoirs. See ER 1110-2-1156 for additional information.

d. Hydrology and hydraulics. Risk-informed decision making provides that existing critical/dependable yield data may be sufficient as a basis for analysis; otherwise, additional critical/dependable yield analysis may be required (see ER 1110-2-240). Operational changes that minimize adverse effects on existing users and authorized purposes should be considered. When reallocating storage from the flood control pool to M&I water supply, effects on existing water supply storage must be evaluated. “Dependable yield mitigation storage” should be considered to compensate these users. Procedures and requirements to analyze and implement dependable yield mitigation storage and operational changes are described in Appendix E of ER 1105-2-100.

9–4. With- and without-project condition

Specific elements to be considered when formulating the without-project condition include existing water supplies, existing and expected future water systems, water management contracts and operating criteria, water supplies that are under construction or authorized and likely to be constructed during the period of analysis, the probability of delivery for each source of water supply, water quality, and conservation measures. These elements are also considered under the with-project condition. Serious effects determinations are based on total impacts of the reallocation on the authorized purposes, comparing the with-and-without-project conditions.

9–5. Plan formulation

Structural and nonstructural measures will be formulated and evaluated for the request. Measures will then be combined into standalone and/or combination alternatives for evaluation. Appendix E of ER 1105-2-100 provides additional information on formulation.

9–6. Reallocation evaluation policies

The evaluation of water supply projects must be conducted following the process described in chapter 2 of this regulation The policies described in the following paragraphs apply to the estimation of benefits used in the economic evaluation of water supply projects. Appendix E of ER 1105-2-100 provides additional guidance on these requirements and procedures.

a. Economic values – costs. The cost allocated to the non-federal entity (the price to be charged for the capital investment for the reallocated storage) will normally be established as the highest of the benefits or revenues foregone, the replacement cost, or the updated cost of storage in the federal project. The methodologies to be used to compute these benefits, revenues, and costs are discussed in Appendix E of ER 1105-2-100. The economic costs of the project also include the appropriate share of the annual costs that include specific and joint-use OMRR&R costs.

b. Comprehensive benefits, impacts, and costs. Benefit categories encompass economic (national and regional), environmental (national and regional), and social considerations. Economic, social, and environmental benefits, impacts, and costs are to be identified, measured, and/or qualitatively characterized using the four P&G accounts: NED, RED, EQ, and OSE.

c. Economic values – national benefits. Where the price of water reflects its marginal cost, that price is used to calculate willingness to pay for additional water supply. If such direct measures of marginal willingness to pay are not available, the benefits are measured by the cost of the alternative most likely to be implemented in the absence of the proposed plan. The benefits from nonstructural measures are also computed using the cost of the most likely alternative.

d. Financial feasibility. A test of financial feasibility must be performed to demonstrate that reallocation of storage is the most efficient water supply alternative.

e. Project recommendation policies. Recommendation of a storage reallocation alternative must be based on an evaluation of several factors, including the test of financial feasibility. There is a wide array of information to be evaluated, such as: least

impactful to other project purposes; preference of non-federal partner; state water rights; and the four P&G accounts (NED, RED, EQ, and OSE).

f. Risk analysis techniques. Risk analysis techniques are required for all water resources studies; however, techniques for domestic, M&I water supply projects have not been specifically developed. Where water supply constitutes a substantial portion of total benefits, districts are required to perform, at a minimum, sensitivity analysis of key variables such as cost of least cost alternative, future demand for water, and future availability of water supplies.

9–7. Cost sharing requirements

Chapter 2 discusses general cost sharing considerations applicable to all project purposes including water supply. Specific cost sharing requirements for this purpose are discussed in Appendix E of ER 1105-2-100.

a. Addition of storage. When water supply storage is added to an existing project and storage is not reallocated, a willingness to pay concept is used to assign costs to the new water supply purpose. Under this concept, the non-federal partner is responsible for 100 percent of the new construction costs allocated to domestic, M&I water supply, plus 50 percent of the non-federal partner's savings. This is to be paid during the construction period.

b. Water withdrawal contracts. USACE will not use 31 USC 9701, Fees and charges for Government services and things of value, to obtain reimbursement for water supply withdrawals.

9–8. Water supply storage policies

a. Construction of new projects or modifications to existing projects for domestic, municipal and industrial purposes. USACE-provided water supply service normally means reservoir space for storing water and, where necessary, facilities in the project structure for releasing or withdrawing the stored water for water supply purposes. The non-federal partner must pay all costs allocated to domestic, M&I water supply storage space. Conduits for release or withdrawal of stored domestic, M&I water may be designed as an integral part of a dam structure. Costs are identified as specific domestic, M&I water supply storage costs with 100 percent of the proportionate investment and 100 percent of the proportionate OMRR&R costs paid by the users.

b. Multipurpose project. To be considered multipurpose, a project must fall in one of the following categories:

(1) The project has justified separable storage for FRM, navigation, or agricultural water supply. In this case the sum of benefits for these purposes must be at least 10 percent of total NED benefits. If domestic, M&I water supply exceeds 90 percent of total benefits the project is considered single purpose domestic, M&I water supply, and thus not eligible for federal participation.

(2) The project has no justified separable storage for FRM, navigation, or agricultural water supply. In this case the sum of benefits for these purposes must be at least 20 percent of total NED benefits. If domestic, M&I water supply exceeds 80 percent of total benefits the project is considered single purpose domestic, M&I water supply, and thus not eligible for federal participation.

c. Single purpose water supply. USACE does not conduct single purpose water supply studies, except for analysis of existing data under Section 22 of the WRDA of 1974 (42 USC 1962d-16), as amended. This constraint does not apply to single purpose water supply modifications to previously constructed projects having FRM or navigation purposes. Also, USACE may conduct reimbursable single purpose water supply studies for non-federal partners under provisions of the Intergovernmental Cooperation Act of 1968 (42 USC 4201-4233).

d. Cost of storage. The cost of storage and associated facilities must be repaid by the user. The Secretary is authorized to make agreements with Tribes, states, municipalities, and non-federal entities for right to storage in USACE reservoirs.

e. Construction of agricultural water supply.

(1) Recommended plans for new construction or for reallocation for agricultural water supply may be formulated for Congressional authorization. Section 103(c)(3) of WRDA 1986 (33 USC 2213) authorizes a non-federal cost share of 35 percent for this purpose. The non-federal partner is responsible for 100 percent of the OMRR&R costs of the project.

(2) Section 8 of the Flood Control Act of 1944 (43 USC 390) provides that USACE reservoirs may be utilized for the purpose of irrigation upon recommendation of the Secretary of the Interior, in connection with irrigation works recommended by the Secretary of the Interior for authorization by Congress. The Department of the Interior is responsible for constructing, operating, and maintaining the additional irrigation works, as well as contracting for the storage space under Reclamation law (the Reclamation Act of June 17, 1902, 32 Stat. 388, and Acts amendatory thereof or supplementary thereto). Section 8 applies only to the 17 Western States defined as those 17 contiguous states lying west of the 98th meridian. This authority should be distinguished from those in paragraph 9-2 above, as subject to the contractual provisions of Reclamation statutes rather than to USACE Civil Works authorities.

f. Reallocation of storage.

(1) USACE is authorized to formulate recommended plans for authorization for permanent reallocation of storage from other purposes to domestic, M&I or agricultural water supply at USACE reservoirs. Those plans may be submitted to Congress for authorization through the authority of a reallocation report or a Section 216 report utilizing the authority in Section 8106(b) of WRDA 2022 (33 USC 2282g). Current policy prohibits reallocation of storage from the FRM pool.

(2) Under the Water Supply Act of 1958 as amended (43 USC 390b) the ASA(CW) is also authorized to reallocate storage in existing reservoirs for domestic, M&I water supply purposes without further Congressional action if the reallocation would not seriously affect the authorized purposes or involve major structural or operational changes to the reservoir. This authority does not include agricultural water supply as such, nevertheless, as indicated below, domestic, M&I storage may encompass certain horticultural and agricultural uses, taking account of state water law classifications.

(3) Section 931 of WRDA 1986, amending Section 8 of the Flood Control Act of 1944 (43 USC 390) authorizes the Secretary to enter into contracts for the interim irrigation use of M&I water supply storage, which is not currently under contract, for such periods as deemed reasonable until the storage is required for M&I water supply. No contracts for the interim use of such storage will be entered into which would

significantly affect then-existing uses of such storage. The appropriate Regional Integration Team should be consulted if such an agreement is requested regarding further coordination with USACE Headquarters and the Office of the ASA(CW) concerning pricing and other payment obligations.

(4) The Secretary can also enter into agreements with states, municipalities, private entities, or individuals for the use of surplus water as defined, and under the conditions described, in paragraph 9-8*k*. Surplus water can also be used to respond to droughts and other emergencies affecting M&I water supplies.

g. Water rights. Institutional requirements such as Tribal and state water rights will be considered in formulating plans to allocate reservoir storage for water supply users. Potential encroachment on the water rights of lawful downstream water users by the operation of water supply storage must be carefully considered and coordinated with responsible Tribal, state, and local interests. USACE will not acquire water rights necessary for use of stored water; this is a responsibility of the water users. Nor should USACE become involved in resolving conflicts among water users concerning rights to use stored water but will look to responsible state agencies to resolve such conflicts. Where there is more than one water user, it is recommended to arrange for payment for the entire water supply storage from a single agency.

h. Permanent rights to storage. Under the authority of Public Law 88-140 (43 USC 390c-f (Extension of Right to Water Supply Storage)), the non-federal partner acquires a permanent right to the use of storage as long as the space is physically available.

i. Limits on future use storage. The Water Supply Act of 1958, as amended, states that not more than 30 percent of total construction costs can be allotted to water supply for future use. In addition, USACE policy is to obtain full payment of allocated capital costs from non-federal entities desiring water supply storage prior to or during construction. Failing this, non-federal partners must negotiate a repayment agreement, with payments to begin immediately after construction completion.

j. Inflow crediting. Requests to credit some portion of project inflows to storage allocated under a specific water supply storage agreement may be considered as an alternative to crediting all project inflows to storage accounts based solely on the percentage of storage allocated. Evaluation and comparison of such alternatives will consider any redistribution of expected benefits for authorized purposes as well as other criteria and institutional requirements.

k. Surplus water. Under Section 6 of the Flood Control Act of 1944, the Secretary is authorized to make agreements with states, municipalities, private concerns, or individuals for uses of surplus water that may be available at any USACE reservoir. These agreements may be for domestic and M&I uses, but not for irrigation within the meaning of 43 USC 390.

(1) An Army General Counsel opinion of March 13, 1986, in a memorandum entitled “Proposed Contracts for Municipal and Industrial Water Withdrawals from Main Stem Missouri Reservoirs,” interprets surplus water as water that can be withdrawn from a USACE reservoir without affecting operations for authorized purposes, for example, because the authorized use for the water never developed or the need was reduced by changes that occurred since authorization or construction. This requires a determination that the water is not needed to fulfill a project purpose in the USACE reservoir during a specific time period.

(2) Use of the Section 6 authority should be limited to circumstances where permanent storage agreements are not appropriate or feasible, such as when use of the water is needed for a short term only, or use is limited to small withdrawals by a single individual or entity.

(3) Terms of the agreements are normally for five years, with an option for a five-year extension, subject to the space being needed for the authorized purposes, or the authorized purpose is deauthorized.

(4) When the user desires long-term use, a permanent storage reallocation study should be considered under the authority of the Water Supply Act of 1958, as amended.

Chapter 10
Multiple Purpose Studies

10–1. Definition

Multiple purpose studies can examine more than one type of water resources problem or opportunity and recommend projects with more than one purpose. USACE mission areas can be combined to address multiple objectives within the localized study area. For example, many existing FRM dams also supply water for domestic, M&I, or agricultural uses, or provide hydropower. Additionally, there may be opportunities to address some combination of purposes which also could include ecosystem restoration and/or recreation. Oftentimes there will be competing water resources uses; therefore environmental, social, and economic considerations need to be evaluated. The evaluation process for these projects will demonstrate the trade-offs for providing various combinations and levels of economic, social, and environmental outputs. Multiple purpose studies will typically result in the recommendation of a single project or set of projects that satisfy the range of water resources purposes identified.

10–2. Comprehensive studies

A comprehensive study characterizes, measures, and evaluates a particular water resources problem or opportunity across a broad area or region. Typically, the focus of comprehensive studies is water resources problems related to the USACE main mission areas (FRM, CSRM, aquatic ecosystem restoration, or navigation). Non-federal entities with interests common to the USACE mission area(s) identified should be encouraged to participate in the study investigations; the general public should not only be informed about the study but also be canvassed for information related to needs, opportunities and constraints. Based on evaluation that considers existing and without-project conditions, the study will determine the need for further USACE studies and projects.

10–3. Watershed studies

Watershed studies are planning initiatives of a multipurpose and multi-objective scope that typically involve several, sometimes competing, water resources problems and opportunities. Such studies accommodate flexibility and collaboration in the formulation and evaluation process. Possible areas of investigation for a watershed study include water supply, natural resource preservation, ecosystem restoration, environmental infrastructure, recreation, navigation, FRM activities, and RED. This multipurpose approach is recommended since numerous entities within the boundaries of any watershed must agree with and support watershed improvement and management

initiatives to successfully implement effective system-wide solutions. The outcome of a watershed study will generally be a watershed resources management plan which identifies the combination of recommended actions to be undertaken by various partners and stakeholders to achieve the needs and opportunities identified in the study. The watershed resources management plan may or may not identify further USACE studies or implementation projects.

10–4. Cost sharing requirements

Multiple purpose studies and projects are cost shared according to the cost sharing policies applicable to each project purpose required. Before determining the required cost sharing for projects, an allocation of total project costs to each purpose must be accomplished. The following paragraphs summarize the requirements and procedures used by USACE for allocating costs of multiple purpose projects. Detailed cost allocation procedures are discussed in the multiple purpose section of Appendix E of ER 1105-2-100 .

a. Cost allocation. The need for cost allocation stems from pricing and cost sharing policies that vary among purposes. Cost allocation is the process of distributing total project financial costs among purposes served by a project. Financial costs are implementation outlays, transfer payments such as replacement housing assistance, and the market value of in-kind contributions. Financial costs are to be allocated to those purposes for which the project is formulated.

b. Cost allocation standard. Cost sharing policies may differ for construction costs and other costs such as OMRR&R costs. Allocations for each one of these types of costs must be made to the appropriate project purpose.

c. Cost apportionment. Once costs are allocated to the appropriate project purpose, the financial costs are apportioned to the federal and non-federal partners following the cost sharing policies in chapter 2 and Appendix E of ER 1105-2-100.

Appendix A
References

Section I

Required Publications

Unless otherwise indicated, all U.S. Army Corps of Engineers publications are available on the USACE website at https://publications.usace.army.mil. Public laws, CFR references, and USC references are available at https://www.govinfo.gov.

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ER 1100-2-8162
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Safety of Dams - Policy and Procedures

ER 1110-2-8159
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ER 1110-2-8160
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ER 1165-2-26
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ER 1165-2-123
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ER 1165-2-130
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ER 1165-2-132
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ER 1165-2-217
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ER 1165-2-504
Construction of Water Resource Development Projects by Non-Federal Interests

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Proposed Practices for Economic Analysis of River Basin Projects. May 1950. (Available at https://planning.erdc.dren.mil/)

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42 USC 4201-4233
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43 USC 390b-2
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43 USC 390c-f
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Section II

Prescribed Forms

This section contains no entries.

Glossary of Terms

ASA(CW) (Assistant Secretary of the Army for Civil Works)
The Assistant Secretary of the Army for Civil Works establishes policy direction and provides supervision of the Department of the Army functions relating to all aspects of the Civil Works program of the United States Army Corps of Engineers.

ASP (Agency specific procedures)
The framework for formulating, evaluating, and comparing water resources projects, programs, activities and related actions based on the Principles, Requirements, and Interagency Guidelines for Federal Investments in Water Resources.

ATON (Aid to navigation)
Any sort of signal, markers or guidance equipment which aids the traveler in navigation. Federal aids to navigation (ATON) are any marine aid to navigation installed and maintained by the U.S. Coast Guard.

BFE (Base flood elevation)
The elevation of surface water resulting from a flood that has a 1% chance of equaling or exceeding that level in any given year. The base flood elevation is shown on FEMA's Flood Insurance Rate Maps developed for the National Flood Insurance Program.

CEQ (Council on Environmental Quality)
A division of the Executive Office of the President that coordinates federal environmental efforts in the United States and works closely with agencies and other White House offices on the development of environmental and energy policies and initiatives.

CFR (Code of Federal Regulations)
The Code of Federal Regulations is the codification of the general and permanent rules published in the Federal Register by the executive departments and agencies of the Federal Government.

cfs (cubic feet per second)
A measurement of the flow rate or discharge equal to one cubic foot (of water, usually) per second.

CSRM (Coastal storm risk management)
Coastal storm risk management is one element USACE's Civil Work’s flood risk management mission. CSRM activities seek to reduce the threat to life and property from coastal storm flooding through the development and communication of advanced knowledge, technology, and solutions.

EO (Executive Order)
An executive order is a signed, written, and published directive from the President of the United States that manages operations of the federal government.

EQ (Environmental Quality)
The Environmental Quality account displays effects on significant natural and cultural resources.

FEMA (Federal Emergency Management Agency)
A federal agency under the Department of Homeland Security that supports citizens and emergency personnel to build, sustain, and improve the nation's capability to prepare for, protect against, respond to, recover from, and mitigate all hazards.

FRM (Flood risk management)
Flood risk management is one of USACE Civil Work's three core missions. Flood risk management activities seek to reduce the threat to life and property from riverine and coastal storm flooding through the development and communication of advanced knowledge, technology, and solutions.

GNF (General navigation features)
General navigation features are necessary features for the physical movement of vessels, often based on the design vessel, and are the foundation for the formulation of measures and alternatives.

HDC (Hydroelectric Design Center)
The Hydroelectric Design Center is the USACE mandatory Center of Expertise for hydroelectric power plant economic evaluation, engineering, and design as well as a technical Center of Expertise for large pumping plant engineering and design.

HMGP (Hazard Mitigation Grant Program)
FEMA's Hazard Mitigation Grant Program provides funding to state, local, Tribal and territorial governments so they can develop hazard mitigation plans and rebuild in a way that reduces, or mitigates, future disaster losses in their communities.

IWRM (Integrated water resources management)
A process that promotes the coordinated development and management of water, land and related resources in order to maximize economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems.

LERR (Lands, easements, rights-of-way, and relocations)
At local service facility, it is the lands, easements, rights-of-way, and relocations needed for the infrastructure components necessary to obtain the benefits associated with the navigation project.

LERRD (Lands, easements, rights-of-way, relocations, and disposal areas)
Lands, easements, rights-of-way, relocations, and borrow and dredged or excavated materials disposal areas needed for the construction of a water resources development project.

LPP (Locally preferred plan)
An LPP is a plan that is supported by the non-Federal partner that is different from the NED, NER, or total net benefits plan.

LSF (Local service facility)
The local service facilities for a navigation project are those lands, easements, rights-of-way, and relocations (LERR) for infrastructure components that are the full cost responsibility of the non-federal partner.

M&I (Municipal and Industrial)
Municipal and Industrial water supply is a water supply for domestic, public, commercial or industrial use.

MLLW (Mean Lower Low Water)
The average level of the lowest tide for each day computed over a 19-year period (the period of the National Tidal Datum Epoch).

NED (National Economic Development)
The National Economic Development account displays changes in the economic value of the national output of goods and services.

NEPA (National Environmental Policy Act)
Originally signed into law in 1970, the National Environmental Policy Act requires federal agencies to assess the environmental effects of their proposed actions prior to making decisions and to incorporate environmental considerations in their planning and decision-making through a systematic interdisciplinary approach. Federal regulations and other guidance issued by CEQ address the procedural provisions of NEPA and the administration of the NEPA process, including the preparation of environmental impact statements.

NER (National Economic Restoration)
The National Ecosystem Restoration account documents increases (or decreases) in the net quantity and/or quality of desired ecosystem resources.

NFIP (National Flood Insurance Program)
The National Flood Insurance Program, administered by the Federal Emergency Management Agency, provides affordable flood insurance to property owners and encourages communities to adopt and enforce floodplain management regulations.

NNBF (Natural and nature-based features)
The term “natural feature” means a feature that is created through the action of physical, geological, biological, and chemical processes over time. The term “nature-based feature” means a feature that is created by human design, engineering, and construction to provide risk reduction by acting in concert with natural processes. (33 USC 2289)

O&M (Operations and maintenance)
For USACE projects, activities that are conducted by a non-federal partner or USACE to support the function of a constructed water resources development project.

OMRR&R (Operation, maintenance, repair, replacement and rehabilitation)
For USACE projects, activities undertaken at a constructed water resources development project to sustain it and make it available or receive benefits as conceived of in the design.

OSE (Other Social Effects)
The Other Social Effects account registers plan effects from perspectives that are relevant to the planning process, but are not reflected in the NED, NER or EQ accounts.

P&G (Principles and Guidelines)
The 1983 Economic and Environmental Guidelines for Water and Related Land Resources Implementation Studies are also known as the “P&G.” The P&G have provided direction to Federal agencies when evaluating and selecting major water projects, including projects related to navigation, storm resilience, wetland restoration, and flood prevention. The P&G are a predecessor to the 2013 PR&G.

P&S (Principles and Standards)
The Principles and Standards for Planning (1973), or “P&S,” developed the standards and criteria for planning and evaluating water resource projects, and were a predecessor to the 1983 P&G.

PDT (Project delivery team)
The team responsible for a water resources development project that includes the non-federal partner; also referred to as the "study team."

PR&G (Principles, Requirements and Guidelines)
Principles and Requirements for Federal Investments in Water Resources in 2013 and the Interagency Guidelines in 2014 make up the PR&G. The PR&G emphasizes that water resources projects should maximize economic development, avoid the unwise use of floodplains, and protect and restore natural ecosystems. The PR&G are designed to support water infrastructure projects with the greatest public benefits (economic, environmental, and social benefits).

RED (Regional Economic Development)
The Regional Economic Development account displays the regional and localized economic impacts that result from each alternative plan.

TCM (Travel cost method)
Methodology for estimating recreation benefits uses the variable travel cost individual incur to visit a site as a proxy for price to determine net willingness to pay. The TCM consists of deriving a demand curve by using the variable cost of travel and the value of time as proxies for price.

TRG (Tolerable risk guidelines)
Tolerable risk guidelines are used in risk management to guide the process of examining and judging the significance of estimated risks obtained using risk assessment.

UDV (Unit day value)
Methodology for estimating recreation benefits that relies on expert or informed opinion and judgment to approximate the average willingness to pay of users of Federal or Federally assisted recreation resources.

USC (U.S. Code)
The consolidation and codification, by subject matter, of the general and permanent laws of the United States.

USGC (U.S. Coast Guard)
A federal agency under the Department of Homeland Security, the Coast Guard ensures the Nation's maritime safety, security and stewardship.

USEPA (U.S. Environmental Protection Agency)
A federal agency that protects people and the environment from significant health risks, sponsors and conducts research, and develops and enforces environmental regulations.

WRDA (Water Resources Development Act)
The primary authorizing legislation for the U.S. Army Corps of Engineers. This comprehensive legislative package is typically passed every two years, and may include both Congressional policy direction and authorization for USACE water resources activities including studies, projects, programs, and research activities.

WRRDA (Water Resources Reform and Development Act)
The Water Resources Development Act passed by Congress in 2014.