

CECW-P

Regulation
No. 1105-2-100

22 April 2000

Planning
PLANNING GUIDANCE NOTEBOOK

TABLE OF CONTENTS

Paragraph	Page
Chapter 1	1-1
1-1. Background.....	1-1
1-2. Purpose.....	1-1
1-3. Applicability.....	1-1
1-4. Distribution Statement.....	1-1
1-5. References.....	1-4
1-6. Use of this Engineer Regulation.....	1-4
1-7. Availability.....	1-4
1-8. Organization.....	1-4
Chapter 2	2-1
2-1. Introduction.....	2-1
2-2. The Federal Objective.....	2-1
2-3. The Planning Process.....	2-2
2-4. Principles of Analysis.....	2-8
2-5. Partnerships and Teamwork.....	2-14
2-6. A Watershed Perspective.....	2-16
2-7. Environmental Compliance.....	2-16
2-8. Cost Sharing.....	2-16
Chapter 3	3-1
3-1. Purpose and Authorities.....	3-1
3-2. Navigation.....	3-1
3-3. Flood Damage Reduction.....	3-10
3-4. Hurricane and Storm Damage Reduction.....	3-18
3-5. Ecosystem Restoration.....	3-23
3-6. Hydroelectric Power Generation.....	3-26
3-7. Recreation.....	3-28
3-8. Water Supply.....	3-31
3-9. Multiple Purpose Studies.....	3-36
3-10. Other Authorities.....	3-38

Paragraph	Page
Chapter 4	4-1
4-1. Types of Studies and Reports.	4-1
4-2. Corps of Engineers Final Approval Authorities..	4-4
4-3. Procedures for Studies and Reports.	4-5
4-4. Quality Control/Quality Assurance and Policy Review of Feasibility Reports.....	4-9
4-5. Post-authorization Changes.	4-10
4-6. Planning Assistance to States (PAS).....	4-10
4-7. Study and Project Deauthorization.	4-11

LIST OF APPENDICES

Appendix A-References	A-1
Appendix B-Public Involvement and Coordination.....	B-1
Appendix C-Environmental Compliance	C-1
Appendix D-Economic and Social Considerations	D-1
Appendix E-Civil Works Programs	E-1
Appendix F-Continuing Authorities Program.....	F-1
Appendix G-Planning Reports and Programs	G-1
Appendix H-Review and Approval of Decision Documents	H-1

CHAPTER 1

Introduction

1-1. Background. The U.S. Army Corps of Engineers is authorized to carry out Civil Works water resources projects for navigation, flood damage reduction and ecosystem restoration, as well as for storm damage prevention, hydroelectric power, recreation, and water supply. Planning for Federal water resources projects constructed by the Corps of Engineers, along with those of the Bureau of Reclamation, Natural Resource Conservation Service, and the Tennessee Valley Authority, is based on the [Principles and Guidelines](#) (P&G) adopted by the Water Resources Council. The P&G are comprised of two parts: The Economic and Environmental *Principles* for Water and Related Land Resources Implementation Studies and The Economic and Environmental *Guidelines* for Water and Related Land Resources Implementation Studies. The first part, commonly referred to as the principles, is reproduced in Figure 1-1. The second part, commonly referred to as the guidelines, expands on the concepts introduced in the principles and provides additional information and requirements to conduct water resources planning studies. Together both parts provide the framework for Corps of Engineers water resources planning studies. Within this framework, the Corps seeks to balance economic development and environmental needs as it addresses water resources problems. The planning process shall address the Nation's water resources needs in a systems context and explore a full range of alternatives in developing solutions. Innovative solutions and the application of the full range of the Corps programs and authorities are integral to the planning process.

1-2. Purpose. This regulation provides the overall direction by which Corps of Engineers Civil Works projects are formulated, evaluated and selected for implementation. It contains a description of the Corps of Engineers planning process, Corps of Engineers missions and programs, specific policies applicable to each mission and program, and analytical requirements. Its fundamental purpose is to describe the planning process in a straightforward, plain-language manner. While that is not always possible in a technical policy document, every effort will be made to make this process understandable not only to planners but to the entire project delivery team, project partners, and the general public. Just as the planning process must reflect reason and common sense; this regulation also shall reflect that same approach.

1-3. Applicability. This engineer regulation applies to all HQUSACE elements, and all USACE commands having Civil Works responsibilities.

1-4. Distribution Statement. Approved for public release, distribution is unlimited.

Economic and Environmental Principles for Water and Related Land Resources Implementation Studies

These Principles are established pursuant to the Water Resources Planning Act of 1965 (Pub. L. 89-80), as amended (42 U.S.C. 1962a-2 and d-1). These Principles supersede the Principles established in connection with promulgation of principles, standards, and procedures at 18 CFR, Parts 711, 713, 714, and 716.

1. Purpose and Scope

These principles are intended to ensure proper and consistent planning by Federal agencies in the formulation and evaluation of water and related land resources implementation studies.

Implementation studies of the following agency activities are covered by these principles:

- (a) Corps of Engineers (Civil Works) water resources project plans;
- (b) Bureau of Reclamation water resources project plans;
- (c) Tennessee Valley Authority water resources project plans;
- (d) Soil Conservation Service water resources project plans.

Implementation studies are pre- or postauthorization project formulation or evaluation studies undertaken by Federal agencies.

2. Federal Objective

The Federal objective of water and related land resources project planning is to contribute to national economic development consistent with protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements.

- (a) Water and related land resources project plans shall be formulated to alleviate problems and take advantage of opportunities in ways that contribute to this objective.
- (b) Contributions to national economic development (NED) are increases in the net value of the national output of goods and services, expressed in monetary units. Contributions to NED are the direct net benefits that accrue in the planning area and the rest of the Nation. Contributions to NED include increases in the net value of those goods and services that are marketed, and also of those that may not be

marketed.

3. State and Local Concerns

Federal water resources planning is to be responsive to State and local concerns. Accordingly, State and local participation is to be encouraged in all aspects of water resources planning. Federal agencies are to contact Governors or designated State agencies for each affected State before initiating Studies, and to provide appropriate opportunities for State participation. It is recognized, however, that water projects which are local, regional, statewide, or even interstate in scope do not necessarily require a major role for the Federal Government; non-Federal, voluntary arrangements between affected jurisdictions may often be adequate. States and localities are free to initiate planning and implementation of water projects.

4. International Concerns

Federal water resources planning is to take into account international implications, including treaty obligations. Timely consultations with the relevant foreign government should be undertaken when a Federal water project is likely to have a significant impact on any land or water resources within its territorial boundaries.

5. Alternative Plans

Various alternative plans are to be formulated in a systematic manner to ensure that all reasonable alternatives are evaluated.

- (a) A plan that reasonably maximizes net national economic development benefits, consistent with the Federal objective, is to be formulated. This plan is to be identified as the NED plan.
- (b) Other plans which reduce net NED benefits in order to further address other Federal, State, local, and international concerns not fully addressed by the NED plan should also be formulated.
- (c) Plans may be formulated which require changes in existing statutes, administrative regulations, and established common law; such required changes are to be identified.
- (d) Each alternative plan is to be formulated in consideration of four criteria: completeness, effectiveness, efficiency, and acceptability. Appropriate mitigation of adverse effects is to be an integral part of each alternative plan.

(e) Existing water and related land resources plans, such as State water resources plans, are to be considered as alternative plans if within the scope of the planning effort.

6. Plan Selection

A plan recommending Federal action is to be the alternative plan with the greatest net economic benefit consistent with protecting the Nation's environment (the NED plan), unless the Secretary of the department or head of an independent agency grants an exception to this rule. Exceptions may be made when there are overriding reasons for recommending another plan, based on other Federal, State, local and international concerns.

7. Accounts

Four accounts are established to facilitate evaluation and display of effects of alternative plans. The national economic development account is required. Other information that is required by law or that will have a material bearing on the decision-making process should be included in the other accounts, or in some other appropriate format used to organize information on effects.

(a) The national economic development (NED) account displays changes in the economic value of the national output of goods and services.

(b) The environmental quality (EQ) account displays non-monetary effects on significant natural and cultural resources.

(c) The regional economic development (RED) account registers changes in the distribution of regional economic activity that result from each alternative plan. Evaluations of regional effects are to be carried out using nationally consistent projections of income, employment, output and population.

(d) The other social effects (OSE) account registers plan effects from perspectives that are relevant to the planning process, but are not reflected in the other three accounts.

8. Discount Rate

Discounting is to be used to convert future monetary values to present values.

9. Period of Analysis

The period of analysis to be the same for each alternative plan.

10. Risk and Uncertainty

Planners shall identify areas of risk and uncertainty in their analysis and describe them clearly, so that decisions can be made with knowledge of the degree of reliability of the estimated benefits and costs and of the effectiveness of alternative plans.

11. Cost Allocation

For allocating total project financial costs among the purposes served by a plan, separable costs will be assigned to their respective purposes, and all joint costs will be allocated to purposes for which the plan was formulated. (Cost sharing policies for water projects will be addressed separately.)

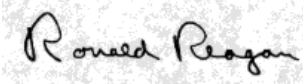
12. Planning Guidance

In order to ensure consistency of Federal agency planning necessary for purposes of budget and policy decisions and to aid States and the public in evaluation of project alternatives, the Water Resources Council (WRC), in cooperation with the Cabinet Council on Natural Resources and Environment, shall issue standards and procedures, in the form of guidelines, implementing these Principles. The head of each Federal agency subject to this order will be responsible for consistent application of the guidelines. An agency may propose agency guidelines which differ from the guidelines issued by WRC. Such agency guidelines and suggestions for improvements in the WRC guidelines are to be submitted to WRC for review and approval. The WRC will forward all agency proposed guidelines which represent changes in established policy in the Cabinet Council on Natural Resources and Environment for its consideration.

13. Effective Date

These Principles shall apply to implementation studies completed more than 120 days after issuance of the standards and procedures referenced in Section 12, and concomitant repeal of 18 CFR, Parts 711, 713, 714, and 716.

These economic and environmental Principles are hereby approved.



February 3, 1983

(Note: Text retyped for clarity. Signature scanned from original document.)

1-5. References. Relevant published references indicated in the text of each chapter of this engineer regulation are listed in Appendix A.

1-6. Use of this Engineer Regulation. This engineer regulation provides the requirements for conducting planning studies within the U. S. Army Corps of Engineers Civil Works program. This engineer regulation will also be useful in orienting and familiarizing newly assigned personnel, military and civilian, study /project cost-sharing partners and other interested publics with essential requirements regarding the conduct of Corps of Engineers Civil Works activities.

1-7. Availability. This regulation is available at the following web site: <http://www.usace.army.mil/inet/usace-docs/er/er1105-2-100/toc.htm>. When this regulation is viewed on this site, active hyperlinks are provided to other sections and appendices within this document and to other related regulations and documents. If this document is printed, the hyperlinked references will have to be printed separately. The version of this regulation on the web site is the official and current version. Every effort will be made to notify users when this regulation is updated.

1-8. Organization. This regulation consists of a main regulation and eight appendices. Appendix B provides the requirements for public involvement, collaboration and coordination in Civil Works planning studies. Appendix C addresses the integration of environmental evaluation and compliance requirements into the planning of Civil Works projects. Appendix D covers economic and social considerations, other than procedures for estimating NED benefits, in water resources planning studies. Appendix E provides policy and planning guidance for each Civil Works mission of the Corps of Engineers. Appendix F provides general program principles, policies and planning guidance for the nine legislative authorities under the Continuing Authorities Program (CAP). Appendix G provides guidance and procedures for the management and conduct of planning studies, activities and programs. Appendix H provides review and approval procedures for decision documents.

CHAPTER 2

Planning Principles

2-1. Introduction. The Corps of Engineers planning process is grounded in the economic and environmental [Principles and Guidelines](#) (P&G) promulgated in 1983 and set forth in different parts of this document. It is also grounded in the laws which apply to the Civil Works Program and to the Corps of Engineers missions. The P&G were set forth to provide for the formulation of reasonable plans responsive to National, State and local concerns. Likewise, the plans recommended for implementation, in general, are to reasonably maximize net national benefits. The Corps of Engineers planning process shall place specific emphasis on sound judgment; planners and other team members shall be guided by common sense in applying the policies and procedures contained herein. It also shall reflect a systematic and comprehensive treatment of watershed resources, including urban watershed resources. With regard to site-specific project studies, every effort should be made to assure that both economic and environmental value is added to watershed resources.

2-2. The Federal Objective

a. The Federal Objective. [Principles and Guidelines](#) state that the Federal objective of water and related land resources planning is to contribute to national economic development (NED) consistent with protecting the Nation's environment, in accordance with national environmental statutes, applicable executive orders, and other Federal planning requirements. The P&G use of the term objective should be distinguished from study planning objectives, which are more specific in terms of expected or desired outputs. The P&G's objective (Federal objective) may be considered more of a National goal. Water and related land resources project plans shall be formulated to alleviate problems and take advantage of opportunities in ways that contribute to study planning objectives and, consequently, to the Federal objective. Contributions to national economic development (NED outputs) are increases in the net value of the national output of goods and services, expressed in monetary units, and are the direct net benefits that accrue in the planning area and the rest of the Nation. Contributions to NED include increases in the net value of those goods and services that are marketed and also of those that may not be marketed. Protection of the Nation's environment is achieved when damage to the environment is eliminated or avoided and important cultural and natural aspects of our nation's heritage are preserved. Various environmental statutes and executive orders assist in ensuring that water resources planning is consistent with protection. The objectives and requirements of applicable laws and executive orders are considered throughout the planning process in order to meet the Federal objective.

b. Ecosystem Restoration. Ecosystem restoration is one of the primary missions of the Corps of Engineers Civil Works program. The Corps objective in ecosystem restoration planning is to contribute to national ecosystem restoration (NER). Contributions to national ecosystem restoration (NER outputs) are increases in the net quantity and/or quality of desired ecosystem resources. Measurement of NER is based on changes in ecological resource quality

22 Apr 2000

as a function of improvement in habitat quality and/or quantity and expressed quantitatively in physical units or indexes (but not monetary units). These net changes are measured in the planning area and in the rest of the Nation. Single purpose ecosystem restoration plans shall be formulated and evaluated in terms of their net contributions to increases in ecosystem value (NER outputs), expressed in non-monetary units. Multipurpose plans that include ecosystem restoration shall contribute to both NED outputs and NER outputs. In this latter case, a plan that trades off NED and NER benefits to maximize the sum of net contributions to NED and NER is usually recommended.

2-3. The Planning Process. The Corps planning process follows the six-step process defined in the P&G. This process is a structured approach to problem solving which provides a rational framework for sound decision making. The six-step process shall be used for all planning studies conducted by the Corps of Engineers. The process is also applicable for many other types of studies and its wide use is encouraged. The six steps are:

- Step 1 - Identifying problems and opportunities
- Step 2 - Inventorying and forecasting conditions
- Step 3 - Formulating alternative plans
- Step 4 - Evaluating alternative plans
- Step 5 - Comparing alternative plans
- Step 6 - Selecting a plan

A detailed description of each step is presented in subsequent paragraphs. Corps 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.

a. Step 1 - Identifying Problems and Opportunities.

(1) Problems and opportunities statements will be framed in terms of the Federal objective and the specific study planning objectives. Problems and opportunities should be defined in a manner that does not preclude the consideration of all potential alternatives to solve the problems and achieve the opportunities. Problems and opportunities statements will encompass current as well as future conditions and are dynamic in nature. Thus, they can be, and usually are, re-evaluated and modified in subsequent steps and iterations of the planning process.

(2) Properly defined, statements of problems and opportunities will reflect the priorities and preferences of the Federal Government, the non-Federal sponsors and other groups participating in the study process; thus active participation of all stakeholders in this process is strongly recommended. Proper identification of problems and opportunities is the foundation for

scoping the planning process. This problem identification step, and/or “scoping”, should begin as soon as practicable after the decision to initiate a planning study.

(3) The National Environmental Policy Act regulations (40 CFR Parts 1500-1508) require all Federal agencies involved in water resources planning to conduct a process termed "scoping". (See [ER 200-2-2](#) for implementation guidance.) The NEPA scoping process determines the scope of issues to be addressed and identifies the significant issues related to a proposed action. Although NEPA scoping has traditionally been associated solely with identifying the concerns associated with proposed actions, it is possible to combine the NEPA scoping process with step 1 of the planning process. The information on problems and opportunities gathered in step 1 will help to identify primary issues that need to be addressed in subsequent steps of the planning process. Opportunities for combining step 1 of the planning process and the scoping process will vary from study to study, but the opportunity should be explored to minimize duplication of efforts at various stages of the planning process.

(4) Once the problems and opportunities are properly defined, the next task is to define the study planning objectives and the constraints that will guide efforts to solve these problems and achieve these opportunities. Planning objectives are statements that describe the desired results of the planning process by solving the problems and taking advantage of the opportunities identified. The planning objectives must be directly related to the problems and opportunities identified for the study and will be used for the formulation and evaluation of plans. Objectives must be clearly defined and provide information on the effect desired (quantified, if possible), the subject of the objective (what will be changed by accomplishing the objective), the location where the expected result will occur, the timing of the effect (when would the effect occur) and the duration of the effect.

(5) Constraints are restrictions that limit the planning process. Constraints, like objectives, are unique to each planning study. Some general types of constraints that need to be considered are resource constraints and legal and policy constraints. Resource constraints are those associated with limits on knowledge, expertise, experience, ability, data, information, money and time. Legal and policy constraints are those defined by law, Corps policy and guidance. These constraints are discussed in subsequent chapters of this regulation and its appendices. Plans should be formulated to meet the study objectives and to avoid violating the constraints. Thus, a clear definition of objectives and constraints is essential to the success of the planning process.

b. Step 2 – Inventory and Forecast. The second step of the planning process is to develop an inventory and forecast of critical resources (physical, demographic, economic, social, etc.) relevant to the problems and opportunities under consideration in the planning area. This information is used to further define and characterize the problems and opportunities. A quantitative and qualitative description of these resources is made, for both current and future conditions, and is used to define existing and future without-project conditions. Existing conditions are those at the time the study is conducted. The forecast of the future without-project condition reflects the conditions expected during the period of analysis (See paragraph 2-4j for definition of period of analysis). The future without-project condition provides the basis from which alternative plans are formulated and impacts are assessed. Since impact assessment is the

basis for plan evaluation, comparison and selection, clear definition and full documentation of the without-project condition are essential. Gathering information about historic and existing conditions requires an inventory. Gathering information about potential future conditions requires forecasts, which should be made for selected years over the period of analysis to indicate how changes in economic and other conditions are likely to have an impact on problems and opportunities. Information gathering and forecasts will most likely continue throughout the planning process.

c. Step 3 - Formulation of Alternative Plans.

(1) Alternative plans shall be formulated to identify specific ways to achieve planning objectives within constraints, so as to solve the problems and realize the opportunities that were identified in step 1. An alternative plan consists of a system of structural and/or nonstructural measures, strategies, or programs formulated to meet, fully or partially, the identified study planning objectives subject to the planning constraints. A management measure is a feature or an activity that can be implemented at a specific geographic site to address one or more planning objectives. Management measures are the building blocks of alternative plans and are categorized as structural and nonstructural. Equal consideration must be given to these two categories of measures during the planning process. An alternative plan is a set of one or more management measures functioning together to address one or more objectives. A range of alternative plans shall be identified at the beginning of the planning process and screened and refined in subsequent iterations throughout the planning process. However, additional alternative plans may be identified at any time during the process. Plans should be in compliance with existing statutes, administrative regulations, and common law or include proposals for changes as appropriate. Alternative plans shall not be limited to those the Corps of Engineers could implement directly under current authorities. Plans that could be implemented under the authorities of other Federal agencies, State and local entities and non-government interest should also be considered.

(2) The first phase in the plan formulation process is the identification of management measures that could be implemented, giving equal consideration to structural and non-structural measures. The second phase is the formulation of alternative plans by combining the management measures as appropriate. Alternative plans should be significantly differentiated from each other. As a general rule projects must be formulated to reasonably maximize benefits to the national economy, to the environment or to the sum of both. Each alternative plan shall be formulated in consideration of four criteria described in the P&G: completeness, efficiency, effectiveness, and acceptability. 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. Effectiveness is the extent to which the alternative plans contribute to achieve the planning objectives. Efficiency is the extent to which an alternative plan is the most cost effective means of achieving the objectives. Acceptability is the extent to which the alternative plans are acceptable in terms of applicable laws, regulations and public policies. Appropriate mitigation of adverse effects shall be an integral component of each alternative plan.

(3) In formulating alternative plans, it is essential that planners understand and fully visualize the problems of the planning area and how their plans will address these problems. Planners must maintain focus on the larger, complete plan(s) even while carrying out specific, individual tasks. While these individual tasks are necessary, their value is subordinate to successfully creating plans that work and function as visualized by those participating in the planning process. In that regard, vision rather than accountancy shall provide the foundation for sound planning and plan formulation.

(4) Section 904 of the Water Resources Development Act of 1986 (WRDA of 1986) requires the Corps to address the following matters in the formulation and evaluation of alternative plans:

- Enhancing national economic development (including benefits to particular regions that are not transfers from other regions).
- Protecting and restoring the quality of the total environment.
- The well-being of the people of the United States.
- The prevention of loss of life.
- The preservation of cultural and historical values.

(5) Non-structural measures shall be considered as means for addressing problems and opportunities. Non-structural measures may be combined with structural measures to produce a plan or considered as an alternative to structural measures. Non-structural measures shall receive equal consideration in the planning process to structural measures. Management of demand should be considered as a non-structural alternative. Examples are inland waterway congestion fees and changes in water pricing or drought contingency plans. Such measures can delay optimal project on-line dates of structural measures and increase total project net benefits over plans not including the non-structural measures.

(6) Protection of the Nation's environment from adverse effects of each alternative plan, in missions other than ecosystem restoration, is to be provided by mitigation (as defined in 40 CFR 1508.20) of those effects. Each alternative plan shall include mitigation as determined appropriate. Mitigation to address effects on fish and wildlife and their habitat should be determined in consultation with the Federal and State fish and wildlife agencies in accordance with the Fish and Wildlife Coordination Act of 1958. Mitigation to address other adverse effects should be determined in accordance with applicable laws, regulations and Executive Orders. (See Appendix C). Mitigation measures determined to be appropriate should be planned for concurrent implementation with other major project features, where practical. Cost of mitigation measures are part of total project costs and are included in the benefit-cost analysis of alternative plans.

d. Step 4 – Evaluating Alternative Plans.

(1) The evaluation of effects is a comparison of the with-project and without-project conditions for each alternative. The evaluation will be conducted by assessing or measuring the differences between each with- and without-project condition and by appraising or weighting those differences.

(2) Evaluation consists of four general tasks. The first task is to forecast the most likely with-project condition expected under each alternative plan. Each with-project condition will describe the same critical variables included in the without-project condition developed in step 2. Criteria to evaluate the alternative plans include all significant resources, outputs and plan effects. They also include contributions to the Federal objective, the study planning objectives, compliance with environmental protection requirements, the P&G's four evaluation criteria (completeness, effectiveness, efficiency and acceptability) and other criteria deemed significant by participating stakeholders. The second task is to compare each with-project condition to the without-project condition and document the differences between the two. The third task is to characterize the beneficial and adverse effects by magnitude, location, timing and duration. The fourth task is to identify the plans that will be further considered in the planning process, based on a comparison of the adverse and beneficial effects and the evaluation criteria.

(3) Four accounts are established in the P&G to facilitate the evaluation and display of effects of alternative plans.

(a) The national economic development account displays changes in the economic value of the national output of goods and services.

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

(c) The regional economic development account displays changes in the distribution of regional economic activity (e.g., income and employment).

(d) The other social effects account displays plan effects on social aspects such as community impacts, health and safety, displacement, energy conservation and others.

(4) Display of the national economic development and environmental quality accounts is required. Display of the regional economic development and other social effects accounts is discretionary. Evaluation of the beneficial and adverse effects of the alternatives will provide a basis to determine which plans should be considered further, dropped or reformulated. Procedures to evaluate national economic development benefits for each project purpose (i.e., navigation, flood damage reduction, recreation, etc.) are provided in Chapter 3. Additional procedures and requirements are provided in Appendix E.

(6) Steps in the procedures may be abbreviated by reducing the extent of the analysis and amount of data collected where greater accuracy or detail is clearly not justified by the cost of

the plan components being analyzed. The steps abbreviated and the reason for abbreviation shall be documented in the planning reports. Planners can pursue the use of alternative procedures when these would provide a more accurate estimate of benefits. The use of alternative procedures and the consideration of new benefit categories, including the procedures to be used to estimate them, require advance approval from HQUSACE (CECW-P).

e. Step 5 - Comparing Alternative Plans. In this step, plans (including the no action plan) are compared against each other, with emphasis on the outputs and effects that will have the most influence in the decision making process. A comparison of the outputs of the various plans must be made. Beneficial and adverse effects of each plan must be compared. These include monetary and non-monetary benefits and costs. Identification and documentation of tradeoffs will be required to support the final recommendation. The effects include those identified during the evaluation phase and any other significant effects identified in step 5. The comparison step can be defined as a reiteration of the evaluation step, with the exception that in this step each plan (including the no action plan) is compared against each other and not against the without-project condition. The output of the comparison step shall be a ranking of plans.

f. Step 6 - Selecting a Plan. A single alternative plan will be selected for recommendation from among all those that have been considered. 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. The culmination of the planning process is the selection of the recommended plan or the decision to take no action. The criteria for selecting the recommended plan differ, depending on the type of plan and whether project outputs are NED, NER, or a combination of both.

(1) The National Economic Development (NED) Plan. For all project purposes except ecosystem restoration, the alternative plan that reasonably maximizes net economic benefits consistent with protecting the Nation's environment, the NED plan, shall be selected. The Assistant Secretary of the Army for Civil Works (ASA (CW)) may grant an exception when there are overriding reasons for selecting another plan based upon other Federal, State, local and international concerns. (See paragraph 2-3g(4))

(2) The National Ecosystem Restoration (NER) Plan. For ecosystem restoration projects, a plan that reasonably maximizes ecosystem restoration benefits compared to costs, consistent with the Federal objective, shall be selected. The selected plan must be shown to be cost-effective and justified to achieve the desired level of output. This plan shall be identified as the National Ecosystem Restoration (NER) Plan.

(3) The Combined NED/NER Plan. Projects which produce both National Economic Development (NED) benefits and National Ecosystem Restoration (NER) benefits will result in a "best" recommended plan so that no alternative plan or scale has a higher excess of NED benefits plus NER benefits over total project costs. This plan shall attempt to maximize the sum of net NED and NER benefits, and to offer the best balance between two Federal objectives. Recommendations for multipurpose projects will be based on a combination of NED benefit-cost analysis, and NER benefits analysis, including cost effectiveness and incremental cost analysis.

(4) The Locally Preferred Plan. Projects may deviate from the National Economic Development Plan and/or the National Ecosystem Restoration Plan if requested by the non-Federal sponsor and approved by ASA(CW). In some instances, a non-Federal sponsor may not be able to afford or otherwise support the NED, NER or Combined NED/NER Plan. Plans requested by the non-Federal sponsor that deviate from these plans shall be identified as the Locally Preferred Plan (LPP). When the LPP is clearly of less scope and cost and meets the Administration's policies for high-priority outputs, an exception for deviation is usually granted by ASA(CW). In making a decision to recommend a LPP smaller in scope and costs than the NED, NER or Combined NED/NER plans, the district should assist the sponsor in identifying and assessing the financial capability of other potential non-Federal interests who may be willing and able to participate in plan development and implementation. In all cases, the LPP must have greater net benefits than smaller scale plans, and enough alternatives must be analyzed during the formulation and evaluation process to insure that net benefits do not maximize at a smaller scale than the sponsor's preferred plan. Paragraphs 4-3b(2)(a) and (b) describe the documentation required to support recommendation of a LPP. Categorical exemptions specifically applicable to flood control and navigation are discussed in paragraphs 3-3b(11) and 3-2b(10). If the sponsor prefers a plan more costly than the NED plan, the NER Plan or the combined NED/NER Plan, and the increased scope of the plan is not sufficient to warrant full Federal participation, ASA(CW) may grant an exception as long as the sponsor pays the difference in cost between those plans and the locally preferred plan. The LPP, in this case, must have outputs similar in-kind, and equal to or greater than the outputs of the Federal plan. It may also have other outputs. The incremental benefits and costs of the locally preferred plan, beyond the Federal plan, must be analyzed and documented in feasibility reports (see paragraph 4-3b(2)(b)).

(5) Agency Decision Making. Decision making for the selection of a recommended plan begins at the district level and continues at the Headquarters level through subsequent reviews and approval. In the case of continuing authorities projects, the review and approval occurs at the Division level. For congressionally authorized projects, the final agency decision maker is the Secretary of the Army through the Assistant Secretary of the Army for Civil Works.

2-4. Principles of Analysis. The principles of analyses that follow are fundamental to the planning process and are to be followed in conducting planning studies.

a. System Analysis. All Corps study initiatives shall consider broad system aspects of problems and solutions. In some instances these system considerations will be addressed throughout the planning process, such as in watershed or navigation systems studies. In other instances, such as with more limited project-oriented studies, systems considerations should be included in a reasonable and cost-effective manner as part of the initial phase of the planning process.

b. With and Without-Project Analysis.

(1) The without-project condition is the most likely condition expected to exist in the future in the absence of a proposed water resources project. Proper definition and forecast of the future without-project condition are critical to the success of the planning process. The future without-project condition constitutes the benchmark against which plans are evaluated. Forecasts of future without-project conditions shall consider all other actions, plans and

programs that would be implemented in the future to address the problems and opportunities in the study area in the absence of a Corps project. Forecasts should extend from the base year (the year when the proposed project is expected to be operational) to the end of the period of analysis.

(2) The with-project condition is the most likely condition expected to exist in the future with the implementation of a particular water resources development project. Comparison of conditions with the project to conditions without the project will be performed to identify the beneficial and adverse effects of the proposed plans. These with and without-project comparisons provide the framework for the evaluation of alternative plans.

(3) Forecasts of with- and without-project conditions should be based on consideration of national and regional forecasts of socio-economic parameters (i.e., income, employment, populations, etc) and other aggregate projections such as exports, land use trends and demand for goods and services. National projections used in planning shall be based on a full employment economy. Other plans that have been adopted for the planning area and other current planning efforts with high potential for implementation or adoption shall be considered as part of the forecasted without-project condition.

(4) Expected environmental conditions, especially trends in ecosystem change, shall be considered in forecasting with- and without-project conditions. Forecasted environmental conditions can be based on a variety of different sources of information available from Federal, State and other natural resource management agencies and private conservation entities. National and State environmental and health standards and regulations shall be recognized and appropriately considered. Standards and regulations concerning water quality, air quality, public health, wetlands protection, and floodplain management should be given specific consideration in forecasting the with- and without-project conditions.

c. Benefit-Cost Analysis and Cost Effectiveness Analysis.

(1) Benefit-Cost analysis is a conceptual framework useful in evaluating government (and private) investments. In principle it is uncomplicated: all pertinent costs and effects (beneficial and detrimental) of an action are systematically tallied. The results can then be tested against investment criteria, such as benefits greater than costs and maximum net benefits which is the criterion used for identification of the NED Plan in accordance with the Federal objective.

(2) All of a project's monetized benefits, which occur through time, are accumulated, and using a process called discounting are expressed as a single total benefit figure. Costs also occur through time, and the same accumulating and discounting process is conducted, so the costs are also expressed as a single figure. Benefit and cost time streams are directly comparable only as converted to single figures. If the benefits exceed the costs the project may be said to be worthwhile.

(3) Planners may consider plans with different sizes, locations, outputs and costs of implementation in the same study. In effect, different plans are different projects, but the benefits and costs of each may be summarized; and all projects may be compared in a relatively straightforward way by consistent application of benefit-cost principles.

(4) There are similarities between benefit-cost analysis and financial appraisals, but the two are not the same. Caution is required against too easily transferring financial appraisal practices to benefit-cost analysis. For example, all benefits and costs must be accounted: thus (1) donated land (with no financial cost) has a cost in benefit to cost analysis, (2) benefits are counted wherever they accrue (even outside the study area; third party gains would not count in a financial appraisal).

(5) When there is no monetary measure of benefits but project outcomes can be described and quantified in some dimension, cost effectiveness analysis can be used to assist on the decision making process. Cost effectiveness analysis seeks to answer the question: given an adequately described objective, what is the least-costly way of attaining the objective? The ability to identify the least costly among several alternatives having the same outcome is very useful. However, cost effectiveness analysis cannot establish that any project is worthwhile. Cost effectiveness can also aid choice among projects that differ in their outcomes, but in the absence of monetized benefit estimates cannot remove all ambiguity.

d. Net Benefits (optimization). The best project may be defined as the plan that returns the greatest excess of benefits over costs, i.e., it is not possible to improve upon a plan producing maximum net benefits (total benefits less total costs). Benefits can be monetary or nonmonetary, as in the case of ecosystem restoration projects. The process of optimizing net benefits should be reasonable and practical in seeking to maximize net benefits.

e. Incremental Analysis. Incremental analysis is a process used in plan formulation to help identify plans that deserve further consideration in an efficient manner. The analysis consists of examining increments of plans or project features to determine their incremental costs and incremental benefits. Increments of plans continue to be added and evaluated as long as the incremental benefits exceed the incremental costs. When the incremental costs exceed the incremental benefits no further increments are added. For example, fifteen levees, each of a different height, could be designed to find the one with greatest net benefits. This is trial and error. An alternate approach is to start with a levee of low height, then add height in steps or increments (say one foot). For each increment of height the added (incremental) costs and added (incremental) benefits are estimated. As long as the incremental benefits exceed the incremental costs it makes sense to add the foot of height, because the extra foot adds more to benefits than to costs. When incremental costs exceed incremental benefits, no further increments of height are added. This process is more efficient than trial and error, and is thus used in formulating and evaluating most Corps projects.

f. Trade-off Analysis. In planning for multipurpose or multiobjective projects, the Corps needs to strike a balance between financial resources and the commodities that can be produced ("purchased") by the project. Trade-off analysis is the procedure used by the Corps to identify the potential gains and losses associated with producing a larger or lesser amount of a given output or outputs. The results of trade-off analysis are used in the formulation, evaluation, comparison and selection of the recommended plan. For example, consider a trade-off common in Corps planning: river flows are set by nature and cannot be augmented. In a reservoir, therefore, each cubic foot of water sent through generators for hydropower means less retained

behind a dam for recreation. Having more recreation water and more electricity generation is not possible (for a fixed amount of water). It is possible to express the relationship between electricity gains and recreation losses over a range (maybe a wide range) of gains and losses. Assessing these types of trade-offs is common in Corps project planning. Appendix E provides additional information on trade-off analysis.

g. Risk and Uncertainty. The P&G state that planners shall characterize, to the extent possible, the different degrees of risk and uncertainty inherent in water resources planning and to describe them clearly so decisions can be based on the best available information. Risk-based analysis is defined as an approach to evaluation and decision making that explicitly, and to the extent practical, analytically incorporates considerations of risk and uncertainty. Risk-based analysis shall be used to compare plans in terms of the likelihood and variability of their physical performance, economic success and residual risks. A risk-based approach to water resources planning captures and quantifies the extent of risk and uncertainty in the various planning and design components of an investment project. The total effect of risk and uncertainty on the project's design and viability can be examined and conscious decisions made reflecting an explicit trade-off between risk and costs. Specific applications of the risk-based approach are discussed in Chapter 3 for each Civil Works mission.

h. Planning Area. The planning area is a geographic space with an identified boundary that includes the area identified in the study authorizing document and the locations of alternative plans which are often called project areas. The locations of resources that would be directly, indirectly, or cumulatively affected by alternative plans are often called the affected area.

i. Prices. The general level of prices for inputs and outputs prevailing during or immediately preceding the period of planning shall be used for the entire period of analysis. Project benefits and costs must be compared at a common point in time and both must be updated periodically. Discounting shall be used to convert future monetary values to present values. Present values, at the base year of analysis, shall be calculated using the discount rate established annually for the formulation and economic evaluation of plans for water and related land resources (published by HQUSACE as an Economic Guidance Memorandum).

j. Period of Analysis. The period of analysis shall be the same for each alternative plan. The period of analysis shall be the time required for implementation plus the lesser of: (1) the period of time over which any alternative plan would have significant beneficial or adverse effects, (2) a period not to exceed 50-years except for major multiple purpose reservoir projects, or, (3) a period not to exceed 100 years for major multiple purpose reservoir projects. Appropriate consideration should be given to environmental factors that may extend beyond the period of analysis.

k. NED costs.

(1) Project measures, whether structural or nonstructural, require the use of various resources. NED costs are used for the economic analysis of alternative projects and reflect the opportunity costs of direct or indirect resources consumed by project implementation. From an economic perspective, the real measure of cost is opportunity cost, i.e., the value of that which is foregone

when a choice of a particular plan or measure is made. In order to capture the opportunity costs of proposed plans, NED costs include three types of costs: implementation costs, other direct costs and associated costs.

(2) Implementation costs are explicit costs of implementing a project. They include the post authorization planning and design costs, construction costs, construction contingency costs, and operations, maintenance, repair, rehabilitation and replacement costs (OMRR&R). These also include costs for all fish and wildlife habitat mitigation, historic and archaeological mitigation and data recovery, lands, easements, relocations, rights-of-way, disposal/borrow areas and water and mineral rights, which are necessary to implement the project.

(3) Other direct costs are the costs of resources directly required for a project or a plan but for which no implementation outlays are made. Examples of these costs are interest during construction, value of donated land, uncompensated NED losses and other negative externalities.

(4) Associated costs are those costs necessary for production of project outputs for which no project expenditure is made. An example would be the cost of transmission lines provided by the private sector necessary for using energy provided by a hydropower improvement.

(5) Typically, opportunity costs are equal to the market prices of goods and services in competitive markets. However, market prices can be often distorted by monopoly power, price controls, taxes or subsidies. In cases where market prices do not reflect the opportunity cost of resource use, other means are used to develop NED costs. Surrogate values are often used which reflect the opportunity costs from a similar situation. For example, water rates in a community that provides subsidized pricing for disadvantaged may not represent the true value of the water. The true value may be better estimated using the price of water in a neighboring community where competitive markets exist.

1. Environmental and Social Impact Assessment. A number of Federal laws, such as the National Environmental Policy Act of 1969, the Clean Water Act of 1977, as amended and Section 122 of the 1970 River and Harbor and Flood Control Act require consideration of a wide range of effects in planning and decision making. In practice, this has been accomplished through a process commonly called impact assessment. While impact assessment covers the full range of effects, it has traditionally focused on non-monetary effects often called environmental and social impacts. These effects may be either adverse or beneficial, intended or unintended. The impact assessment process is synonymous with step 4 of the planning process (Evaluate Effects of Alternative Plans) previously described.

m. Significant Resources and Significant Effects.

(1) The consideration of significant resources and significant effects is central to plan formulation and evaluation for any type of water resources development project. In step 2 of the planning process, significant resources are identified as important to be considered during the study. In step 4, significant effects are identified for consideration in alternative comparison and selection. Significance of resources and effects will be derived from institutional, public or technical recognition. 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.

Technical recognition of a resource or an effect is based upon scientific or other technical criteria that establishes its significance. Public recognition means some segment of the general public 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.

(2) In ecosystem restoration planning, the concept of significance of outputs plays an especially important role because of the challenge of dealing with non-monetary outputs. The three sources of significance described in paragraph 2-4m(1) and documentation on the relative scarcity of the resources helps determine the significance of the resources to be restored. This information is used to help establish a Federal interest in the project. The significance of expected restoration outputs is used in conjunction with information from cost effectiveness and incremental cost analyses to help determine whether an alternative should be recommended. Information on effectiveness, acceptability, efficiency and completeness of ecosystem restoration plans also contributes to this determination.

n. Regulatory considerations. In the course of planning studies, consideration of Department of the Army regulatory programs (especially Section 10 of the River and Harbor Act of 1899, Section 404 of the Clean Water Act of 1972 and Section 103 of the Marine Protection, Research and Sanctuaries Act of 1972) will be incorporated into the planning process. This is performed to facilitate the permitting of activities essential to a successful project. (See Appendix C for more details on regulatory considerations.)

o. Project Implementation Timing. Alternative plans can differ in their implementation timing, that is, not all plans or features have to be in place at the beginning of the period of analysis. As project on-line dates are varied, annual benefits and costs will often vary. In general, the more the benefits vary through time and the longer the time to implementation from the base year (first year of period of analysis), the stronger this effect will be. The best schedule for implementing project features shall be considered as an element in the formulation and evaluation of alternative plans.

p. Hazardous, Toxic and Radioactive Wastes (HTRW). Consistent with the guidance in [ER 1165-2-132](#), the Corps will not participate in clean up of materials regulated by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) or by the Resource Conservation and Recovery Act (RCRA). Assessments during the feasibility phase to determine the nature and extent of such materials within the project area shall be cost shared. The cost of clean up of materials not covered by CERCLA and RCRA will be considered when determining if the proposed project is justified. While measures to improve water quality parameters may be included in projects with an ecosystem restoration component, the ecosystem restoration portion of these projects should not principally result in treating or otherwise abating pollution or other compliance responsibility.

q. Brownfields. Brownfields are abandoned or under-utilized properties that are perceived to be or, at worst, are lightly contaminated. Brownfields may be included in the preliminary planning phase of projects where they are integral to solving water resources problems related to Corps mission areas and authorities. If the assessment determines that there are non-CERCLA types of materials or small, easily and cost effectively managed amounts of

CERCLA controlled materials, then these sites may be included in project formulation and any remediation costs would be shared as project costs. If the assessment determines a CERCLA level clean-up is required, then the site will be removed from plan formulation for processing under CERCLA procedures. It is important that no unnecessary Federal liability be incurred when working within a Brownfield site.

r. Congressional Adds. The planning principles described in this chapter apply to Congressionally added studies unless specific instructions otherwise are provided through the budget process.

2-5. Partnerships and Teamwork. The success of the planning process depends to a great extent on establishing a successful partnership with the project sponsors and other stakeholders. A project sponsor for a Corps study may be a State, a political subpart of a State or group of states, a Native American (Indian) Nation, quasi-public organizations chartered under State laws (e.g., a port authority, flood control district, water management district or conservation district), an interstate agency and, for a limited number of authorities, a non-profit organization. Except for non-profit organizations, non-Federal entities must meet the requirements of Section 221 of the Flood Control Act of 1970 as amended, in order to be a sponsor for a Corps study. Project sponsors must be afforded the opportunity to help define the water resource problems and opportunities. They should help define the scope of the study and specific study tasks, cost estimates and schedules. Partnerships facilitate making decisions about the type and mix of study objectives as well as formulation, evaluation and selection of alternative plans. They contribute to project design, including environmental and aesthetic features and ensure that, to the extent possible, other factors that affect sponsoring communities are addressed during the planning process.

a. Cooperation with Other Agencies.

(1) Corps efforts should complement and be complemented by the various authorities of other Federal and State agencies, Native American (Indian) Nations and private groups. The Corps may also be requested, or request other agencies, to participate as a cooperating agency during the NEPA process (see 40 CFR 1501.6). While the Corps is the lead agency for studies specifically assigned to it, the Corps may also be a cooperating agency in water resources studies led by other Federal agencies. As a cooperating agency, the Corps can provide its special expertise in navigation, flood damage reduction, ecosystem restoration and other mission areas as part of integrated interagency and multipurpose planning to the U.S. Environmental Protection Agency, the Bureau of Reclamation, the Natural Resources Conservation Service, and other Federal Agencies. Under approved circumstances, participation as a cooperating agency may be funded through existing Corps studies and projects in the study area, or pursued as a separate item in the General Investigations program.

(2) Corps planners and planning team members should develop partnerships with Federal and State agencies, Native American (Indian) Nations and non-government organizations in the accomplishment of Corps studies and financing. Cooperative efforts may include, for example, information and data base sharing, cooperative planning efforts, as well as collaborative and shared construction, operation and maintenance, and monitoring activities. Cooperative efforts,

which effectively combine Federal investments, can achieve greater economic, social, and environmental benefits than individual agencies acting alone.

b. Public Involvement, Collaboration and Coordination.

1) The goal of public involvement, collaboration and coordination is to open and maintain channels of communication with the public in order to give full consideration of public views and information in the planning process. The objective of public involvement is to ensure that Corps projects and programs are responsive to the needs and concerns of the public. Elements critical to a good public involvement and coordination process are disseminating information about proposed activities, understanding the public's desires, needs and concerns, providing for consultation with the public before decisions are reached, and taking into account the public's views. All this must occur, however, with the awareness that the Corps can not relinquish its legislated decision making responsibility.

(2) All Corps planning studies are required to incorporate public involvement, collaboration and coordination with their Federal and non-Federal partners and the public. This should be initiated during step 1 of the planning process, Identifying Problems and Opportunities, and continue throughout the planning process. Involvement at the initial stage of the planning process not only helps to identify the problems and opportunities, but also extends an invitation to the public for continued involvement and a voice in the planning and decision making process.

(3) The team will determine, in the early phases of the planning process, the extent of public involvement required and will establish an appropriate strategy for integrating public involvement into the planning process. It is important to develop a strategy that creates relevant, quality public involvement opportunities for those who have, or may have, an interest in the study. The components of a good public involvement strategy are discussed in Appendix B. The strategy shall reflect the scope and complexity of each particular study.

(4) Major public involvement activities conducted during the planning process are announcing the initiation of the study, identifying the public, and, the scoping process. These activities are described in detail in Appendix B.

c. International Consultations. When a Federal water project is likely to have a significant impact on any land or resources situated in a foreign country or to affect treaty obligations, the Corps, through the Department of State, must enter into consultations with the government of the affected country.

d. Interdisciplinary Planning.

(1) Because planning problems are complex, using an interdisciplinary team is generally the best approach to the wide range of technical issues encountered in most studies. Planning results are usually better when they have been developed from a variety of perspectives, including the knowledge, skills and insights of professionals from many of the natural, social, engineering and environmental sciences.

(2) The disciplines should be integrated so that each member of the team communicates their various viewpoints and works together to fashion plans that truly reflect a diversity of perspectives on the problems and opportunities that confront the planning area. An effective plan formulation process requires that the interdisciplinary team be involved in the planning process from the very beginning. While the mix of disciplines required for a planning team varies from study to study, Corps teams may include the following types of experts: archaeologists, attorneys, biologists, chemists, civil engineers, ecologists, economists, geographers, geologists, hydraulic engineers, hydrologists, landscape architects, planners, real estate specialists and sociologists. This list is not intended to exclude any discipline but rather express the diversity that might be included.

2-6. A Watershed Perspective. Civil works planning should incorporate a watershed perspective, whether that planning involves a project feasibility study or a more comprehensive watershed study. Such planning should be accomplished within the context of an understanding and appreciation of the impacts of considered actions on other natural and human resources in the watershed. In carrying out planning activities, we should encourage the active participation of all interested groups and use of the full spectrum of technical disciplines in activities and decision-making. We also should take into account: the interconnectedness of water and land resources (a systems approach); the dynamic nature of the economy and the environment; and the variability of social interests over time. Specifically, civil works planning should consider the sustainability of future watershed resources, specifically taking into account environmental quality, economic development and social well-being.

2-7. Environmental Compliance. Civil Works studies and projects should be in compliance with all applicable Federal environmental statutes and regulations and with applicable State laws and regulations where the Federal government has clearly waived sovereign immunity. The National Environmental Policy Act (NEPA) requires Federal agencies, including the Corps, to comply with a process that includes the inventory and assessment of the environmental resources within the study area. NEPA also requires the evaluation and comparison of alternatives to determine the impacts to those ecological, cultural, and aesthetic resources identified and investigated. Involvement by resource agencies and the general public during the study process is also required. Corps NEPA guidance can be found in [ER 200-2-2](#). The NEPA process will be integrated with the Corps six step planning process. This should also include all measures required for compliance with other applicable environmental statutes, such as the Endangered Species Act, the Clean Air Act, the Clean Water Act, the Fish and Wildlife Coordination Act, and the Historic Preservation Act, among others. (See Appendix C for compliance requirements.) This integration is intended 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.

2-8. Cost Sharing.

a. General. The costs of water resources studies and projects developed by the Corps are shared between Federal and non-Federal entities as defined in laws and administrative provisions. The WRDA of 1986, established new cost sharing rules for all studies and projects

conducted by the Corps. The cost sharing provisions of the WRDA of 1986 place greater financial responsibilities on non-Federal sponsors of Corps projects. The amount of the non-Federal share varies depending upon the project purpose and the general and specific laws that apply to each project.

b. Local Sponsor Financing. The non-Federal share of a Corps study or project usually consists of some combination of the following components: in kind services, a cash contribution and real estate interests. Sponsors are also responsible for operation, maintenance, repair, replacement and rehabilitation costs as defined for each civil works mission. Sponsors may provide their cash share of project or study costs to the Corps by one of the following means: a check, a deposit in an escrow or similar account with interest accruing to the sponsor, an irrevocable letter of credit or an Electronic Funds Transfer. See [ER 1165-2-131](#) for further information.

c. Study Cost Sharing. Corps of Engineers specifically authorized planning studies are conducted in two phases: Reconnaissance Phase and Feasibility Phase. (See Appendix F for process applicable to the Continuing Authorities Program (CAP).) Cost sharing policies for each of these phases are as follows:

(1) The entire reconnaissance phase, as described in paragraph 4-3a and Appendix G, is conducted at full Federal expense, exclusive of any costs incurred by non-Federal entities in volunteered work or services during this phase. Costs incurred by non-Federal entities during the reconnaissance phase are not creditable toward the non-Federal sponsor's share of the feasibility phase.

(2) The cost of the feasibility phase, as described in paragraph 4-3b and Appendix G, will be shared equally during the study between the Federal government and the non-Federal sponsors. At least 50 percent of a non-Federal sponsor's share (25 percent of the total feasibility phase cost) shall be in cash. The remainder of the non-Federal sponsor share, up to 25 percent of the total feasibility phase cost, may be in-kind products and services. If a cost shared feasibility study is terminated prior to completion, the non-Federal share may be less than 50 percent in cash if the value of the in-kind services is more than one-half of the non-Federal sponsors investment at the time of termination. No credit may be given to the non-Federal sponsor for work prior to the start of the feasibility phase or after its completion (Sec 105 of WRDA of 1986). Guidance on cost sharing for studies conducted under Section 729 of WRDA of 1986 will be provided separately.

(3) Cost sharing is not applicable to single purpose inland navigation studies on the nations inland waterways system. For studies where inland navigation is the primary purpose and there are other purposes being considered, request additional guidance from CECW-P for feasibility phase cost sharing procedures.

(4) Cost sharing exceptions. Exceptions to cost sharing rules include projects specified in Section 103(e)(2) of the WRDA of 1986, waivers for territories as stated in Section 1156 of the WRDA of 1986, and, ability to pay provisions stated in Section 103(m) of the WRDA of 1986, as amended. (See Appendix E for additional details on these exceptions.)

(5) Section 203 of the WRDA of 1996 allows a non-Federal sponsor to defer its cost contribution for excess study costs that are not attributable to changes in Federal law or changes in scope requested by the sponsor, until the execution of a Project Cooperation Agreement. If the project is not authorized, payment of excess costs is due within 5 years after the date of the Chief of Engineer's report. If the study is terminated, payment is due within 2 years of its termination.

d. Preconstruction, engineering and design (PED). Preparation of design documentation reports and plans and specifications during the preconstruction, engineering and design phase will be cost shared in accordance with the cost sharing required for project construction. Under Corps policy, the non-Federal sponsor should provide 25 percent of the cost of PED during this phase. Adjustments, if necessary, shall be made after initiation of the construction phase. (See [ER 1110-2-1150](#)).

e. Project Cost Sharing. Appendix E provides project cost sharing requirements by project purpose.

CHAPTER 3

Corps Civil Works Missions

3-1. Purpose and Authorities. Federal interest in water resources development is established by law. Within the larger Federal interest in water resource development, the Corps of Engineers is authorized to carry out projects in seven mission areas: navigation, flood damage reduction, ecosystem restoration, hurricane and storm damage reduction, water supply, hydroelectric power generation and recreation. Navigation projects include both inland and deepwater projects. Ecosystem restoration projects improve ecosystem structure and function. Wherever possible and subject to budgetary policy, projects shall combine these purposes to formulate multiple purpose projects. For example, flood damage reduction projects could include ecosystem restoration and recreation; navigation projects could include hydroelectric power generation and ecosystem restoration. In carrying out studies to address problems and take advantage of opportunities within these mission areas, every effort should be made to formulate alternative plans that reasonably maximize the economic and environmental value of watershed resources, including urban watershed resources. In addition, every effort shall be made to be responsive to National, State and local concerns by considering the full range of programs available to provide solutions in a timely and cost-effective manner. Such programs may include Congressionally authorized projects, continuing authorities projects, planning assistance to states, flood plain management services and emergency authorities. [For a brief history of Corps involvement in water resources planning refer to “The US Army Corps of Engineers, A Brief History”, by Martin Reuss and Charles Hendricks to be published on the Corps web site.]

3-2. Navigation. The role of the U. S. Army Corps of Engineers with respect to navigation is to provide safe, reliable, and efficient waterborne transportation systems (channels, harbors, and waterways) for movement of commerce, national security needs, and recreation. The Corps accomplishes this mission through a combination of capital improvements and the operation and maintenance of existing projects. Capital improvement activities include the planning, design, and construction of new navigation projects. These activities are performed for the navigation of shallow draft (equal to or less than 14-foot draft) and deep draft (greater than 14-foot draft) vessels on both inland waterways and harbors, and coastal and lake ports, harbors and channels. With the exception of projects implemented pursuant to a continuing authority, Congress specifically authorizes harbor and waterway projects. Financial responsibility for project components is specified in the WRDA of 1986, as amended.

a. Types of Improvements. General navigation features of harbor or waterway projects are channels, jetties or breakwaters, locks and dams, basins or water areas for vessel maneuvering, turning, passing, mooring or anchoring incidental to transit of the channels and locks. Also included are dredged material disposal areas (except those for the inland navigation system, the Atlantic Intracoastal Waterway and the Gulf Intracoastal Waterway) and sediment basins. Special Navigation Programs include removal of wrecks and obstructions, snagging and clearing for navigation, drift and debris removal, bridge replacement or modification, and

mitigation of project-induced damage. These programs are described in more detail in paragraph 3-2a(2).

(1) Harbor and Waterway Projects. Harbors and waterways are treated differently for cost-sharing purposes. Harbors are places that offer vessels shelter from weather. A harbor is also a port if it provides facilities for the loading or unloading of cargo or passengers. Waterways are routes used by vessels. Their primary function is to facilitate the movement of vessels and they may simply connect bodies of deep or shallow water or they may be parts of riverine or coastal waterway systems. (See Table E-60, Appendix E for cost sharing requirements.)

(2) Special Navigation Programs. These navigation improvements are for specific purposes, and may be projects, elements of projects, or simply Corps activities. They are initiated and implemented on congressional authority (specific or continuing). They are usually subject to program or project expenditure limits, with cost sharing as specified in the original authority or as amended.

(a) Removal of Wrecks and Obstructions (Section 19, River and Harbor Act of 3 March 1899). The Corps may remove sunken vessels and similar objects if they are determined to be obstructions to navigation.

(b) Snagging and Clearing for Navigation (Section 3, River and Harbor Act of 1945). The Corps may remove trees, brush and other debris that may be determined to be obstructions to navigation or that may promote flooding.

(c) Drift and Debris Removal (Section 202, Water Resources Development Act Of 1976). The Corps has continuing authority to study and undertake projects to remove and dispose of derelict objects such as sunken vessels, waterfront debris and derelict structures, and other sources of drift that may damage vessels or threaten public health, recreation, or the environment at publicly maintained commercial boat harbors. The harbor need not be, but usually is a Corps project. Congressional authorization is required for projects with Federal costs of \$400,000 or more.

(3) Aids to Navigation. These are buoys, lights, ranges, markers, and other devices and systems required for safe navigation or to achieve the project benefits. Aids to navigation are usually provided by the Coast Guard.

b. Specific Policies.

(1) Shoreline Changes. Pursuant to Section 5 of the River and Harbor Act of 1935, each investigation on navigation improvements potentially affecting adjacent shoreline will include analysis of the probable effects on shoreline configurations. A distance of not less than ten miles along the shore on either side of the improvement should be analyzed.

(2) Charter Fishing Craft, Head Boats, and Similar Recreation-Oriented Commercial Activities. Evaluation of benefits to charter fishing and other similar type craft is based on a

change in net income to the owners or operators of all vessels that would be using harbor facilities in the future without-project condition. Benefits to vessel operations that will be induced by the construction of a navigation project are also evaluated as the change in net income that would occur between the with- and without-project condition. Consideration should be given to those vessels that transfer from other areas, so that the proper change in National net income is estimated. Section 230 of the Water Resource Development Act of 1996 states that benefits to cruise ships will also be estimated as commercial benefits for the purpose of evaluating navigation projects.

(3) Subsistence Fishing. This is the activity of individuals who fish primarily for personal or family consumption and whose incomes are normally at or below the minimum subsistence level established by the Department of Commerce. For cost allocation purposes, subsistence fishing is considered commercial fishing.

(4) Coast Guard Coordination. The U.S. Coast Guard is responsible for Federal aids to navigation and enforcement of navigation regulations. Corps districts should confer directly with the Coast Guard concerning establishment or alteration of aids to navigation, and the regulation of lightage areas (docking and loading areas used to off-load heavy cargo from larger ships to smaller vessels and vice versa), anchorage and channels.

(5) Permit Coordination. During the formulation of navigation projects, a determination must be made whether associated or ancillary sponsor activities (or project user activities) are required to achieve project benefits, and whether Department of the Army (DA) permits are necessary. Examples are provision of mooring and berthing areas and land based infrastructure. Once activities are identified, a preliminary determination of whether they require DA permits, and of what types (i.e., an individual permit, a letter of permission, an existing general permit or a nationwide permit), will be made by the district regulatory office.

(6) Placement of Dredged Materials on Beaches. Construction and maintenance dredging of Federal navigation projects shall be accomplished in the least costly manner possible. When placement of dredged material (beach quality sand) on a beach is the least costly acceptable means for disposal, then such placement is considered integral to the project and cost shared accordingly. When placement of dredged material on a beach costs more than the least costly alternative, the Corps may participate in the additional placement costs under the authority of Section 145 of the WRDA of 1976, as amended. The additional cost of placement may be shared on a 65 percent Federal and 35 percent non-Federal basis if: (1) requested by the State, (2) the Secretary of the Army considers it in the public interest, (3) the added cost of disposal is justified by hurricane and storm damage reduction benefits and (4) the shoreline on which the material is placed is open to public use.

(7) Use of Dredged Material for Ecosystem Restoration. When determining an acceptable method of disposal of dredged material, districts are encouraged to consider options that provide opportunities for aquatic ecosystem restoration. Where environmentally beneficial use of dredged material is the least cost, environmentally acceptable method of disposal, it is cost shared as a navigation cost. Section 204 of the WRDA of 1992, as amended, provides programmatic authority for selection of a disposal method for authorized projects, that provides

aquatic restoration or environmental shoreline erosion benefits when that is not the least costly method of disposal. The incremental cost of the disposal for ecosystem restoration purposes over the least cost method of disposal is cost shared, with a non-Federal sponsor responsible for 25 percent of the costs. Smaller projects typically will be pursued within the programmatic limits of Section 204, as amended. Section 207 of the WRDA of 1996 amended this authority. Section 207 will primarily be used with new navigation projects or in conjunction with maintenance dredging when the incremental cost is large. Projects pursued under Section 207 authority are separately budgeted and will not count towards the Section 204 programmatic limit. (See Appendix E for more information related to Section 207 and Appendix F for additional information regarding Section 204).

(8). Dredged Material Management Plans. Dredged material management planning for all Federal harbor projects is conducted by the Corps to ensure that maintenance dredging activities are performed in an environmentally acceptable manner, use sound engineering techniques, are economically warranted, and that sufficient confined disposal facilities are available for at least the next 20 years. These plans address dredging needs, disposal capabilities, capacities of disposal areas, environmental compliance requirements, potential for beneficial usage of dredged material and indicators of continued economic justification. The Dredged Material Management Plans shall be updated periodically to identify any potentially changed conditions.

(9) Local Service Facilities are the responsibility of non-Federal entities and shall be required as part of the cooperation agreements if they are necessary for project benefits to accrue.

(10) Categorical Exemption to NED Plan. For harbor and channel deepening studies where the non-Federal sponsor has identified constraints on channel depths it is not required to analyze project plans greater (deeper) than the plan desired by the sponsor. For example, if a sponsor only desires to deepen a channel to -40 feet and it is determined that the -40 foot channel is economically justified and has higher net benefits than a -39 foot or -38 foot channel, etc., then the -40 foot channel can be recommended without having to analyze deeper channel plans to identify the NED Plan. The recommended plan must have greater net benefits than smaller scale plans, and a sufficient number of alternatives must be analyzed to insure that net benefits do not maximize at a scale smaller than the recommended plan. If the plan proposed to be recommended contains uneconomical increments an exception from the ASA(CW) must be obtained. An essential element of the analysis of the recommended plan is the identification of trade-offs and opportunities foregone as a result of implementation of the smaller scope plan. The analysis of alternatives must be comprehensive enough to meet the requirements of NEPA.

(11) Other guidance related to navigation projects include [ER 1165-2-27](#), [ER 1165-2-123](#) and [ER 1165-2-124](#).

c. Evaluation Framework. The measurement standard and conceptual basis for 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 evaluation of navigation projects shall be conducted following the process described in paragraph 2-3e of this regulation. The procedures described in the following paragraphs apply to the estimation of benefits used in the economic

evaluation of navigation projects and are only a summary of requirements and procedures. Appendix E provides additional guidance on these procedures and requirements.

(1) National Economic Development Benefits. The base economic benefit of a navigation project is the reduction in the value of resources required to transport commodities. Navigation benefits can be categorized as follows:

(a) Cost reduction benefits for commodities for the same origin and destination and the same mode of transit thus increasing the efficiency of current users. This reduction represents a NED gain because resources will be released for productive use elsewhere in the economy. Examples for inland navigation are reductions in costs incurred from trip delays (e.g. reduction in lock congestions), reduction in costs associated with the use of larger or longer tows, and reduction in costs due to more efficient use of barges. Examples for deep draft navigation are reductions in costs associated with the use of larger vessels, with more efficient use of existing vessels, with more efficient use of larger vessels, with reductions in transit time, with lower cargo handling and tug assistance costs, and with reduced interest and storage costs.

(b) Shift of mode benefits for commodities for the same origin and destination providing efficiency in waterway or harbor traversed. In this case, benefits are the difference in costs of mode transport between the without-project condition (when rails, trucks or different waterways or ports are used) and the with-project condition (improved locks, waterways or channels). The economic benefit to the national economy is the savings in resources from not having to use a more costly mode or point of transport.

(c) Shift in origin and destinations that would provide benefits by either reducing the cost of transport, if a new origin is used or by increasing net revenue of the producer, if a change in destination is realized. This benefit cannot exceed the reduction in transportation costs achieved by the project.

(d) New movement benefits are claimed when there are additional movements in a commodity or there are new commodities transported due to decreased transportation costs. The new movement benefit is defined as the increase in producer and consumer surplus, thus the estimate is limited to increases in production and consumption due to lower transportation costs. Increases in shipments resulting from a shift in origin or destination are not included in the new movement benefits. This benefit cannot exceed the reduction in transportation costs achieved by the project.

(e) Induced movement benefits are the value of a delivered commodity less production and transportation costs when a commodity or additional quantities of a commodity are produced and consumed due to lower transportation costs. The benefit, in this case, is measured as the difference between the cost of transportation with the project and the maximum cost the shipper would be willing to pay.

(2) Without-Project Condition. The following specific assumptions are part of the projected without-project condition.

(a) 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.

(b) For deep draft navigation studies, alternative harbor and channel improvements available over the planning period (in place and under construction) and authorized projects are assumed to be in place. For inland navigation, only waterway investments currently in place or under construction are assumed to be in place over the period of analysis.

(c) Normal operation and maintenance practices are assumed to be performed over the period of analysis.

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

(e) For inland navigation, user charges and/or taxes required by law are part of the without-project condition.

(f) Advances in technology affecting the transportation industry over the period of analysis should be considered, within reason.

(3) With-Project Condition. The with-project condition is the most likely condition expected to exist in the future if a project is undertaken. The same assumptions as for the without-project condition underlie the with-project condition.

(4) Evaluation Procedure for Inland Navigation. The following ten steps are used to estimate benefits associated with improvements of the inland navigation system. The level of effort on each step depends on the nature of the proposed improvement, the state of the art for accurately estimating the benefits and the sensitivity of project formulation and justification to further refinement. Appendix E provides additional guidance for each of these steps.

(a) Step 1 - Identify the Commodity Types. The types of commodities susceptible to movement on the waterway segment under consideration are identified for new waterways and existing waterways, as applicable. For new waterways, commodity types are identified by interviews of shippers and by resources studies. For existing waterways, commodity types are identified by analysis of data on existing use of the waterway segment.

(b) Step 2 - Identify the Study Area. The study area is the area within which significant project impacts occur. The origins and destinations of products likely to use the waterway are normally included in the study area.

(c) Step 3 - Determine Current Commodity Flow. This step identifies the total tonnage that could benefit from using the waterway. This information is primarily obtained by interviews of shippers. Potential commodities that might use the waterway in response to reduced transportation costs are also identified.

(d) Step 4 - Determine Current Cost of Waterway Use. Current cost of waterway use is determined for all commodities that could potentially benefit from the waterway improvement. This cost includes the full origin-to-destination costs, including handling, transfer, demurrage and prior and subsequent hauls for the tonnages identified in the prior step. Costs are estimated for the without-project and with-project conditions. The difference between the with and without-project costs represents the reduction in current delays and gains in efficiencies with the project in place.

(e) Step 5 - Determine Current Cost of Alternative Movement. The current cost of alternative movement is estimated for all commodities under consideration. This cost includes full origin-to-destination costs, including costs of handling, transfer, demurrage and prior and subsequent hauls. The product of this step, combined with the products from the two previous steps, generates a first approximation of the demand schedule for waterway transportation. In the case of rail movements, the prevailing rate actually charged for moving the traffic shall be used to estimate the alternative movement cost. A “competitive” rate may be used if there is no prevailing rate. Appendix E provides a definition and guidance on how to compute “competitive” rates.

(f) Step 6 - Forecast Potential Waterway Traffic by Commodity. Projections of potential traffic are developed for selected years from the time of the study until the end of the period of analysis, for time intervals not to exceed 10 years. Normally, independent studies are undertaken to develop these projections. Available secondary data supplemented by interviews of relevant shippers, carriers and port officials, opinions of commodity consultants and experts and historical flow patterns are used to develop these projections.

(g) Step 7 – Determine Future Cost of Alternative Mode. The future cost of alternative mode per unit of each commodity will normally be the same as the current cost.

(h) Step 8 – Determine Future Cost of Waterway Use. The potential changes in cost of the waterway mode for future years for individual origin-destination commodity combinations are estimated in this step. Also, an analysis of the relationship between waterway traffic volume and system delays is conducted. This analysis generates data on the relationships between total traffic volume and the cost of transportation on the waterway.

(i) Step 9 – Determine Waterway Use, With and Without-Project. The data developed in previous steps is used to determine waterway use over time with and without the project. This determination is made based upon a comparison of costs for movements by the waterway and by the alternative mode and of any changes in the cost functions and demand schedules. The “phasing in” and “phasing out” of shifts from one mode to another are also considered in this analysis.

(j) Step 10 – Compute NED Benefits. The information produced in previous steps is used to compute total NED benefits for each category described in Paragraph 3-2c(1), as applicable. Total NED benefits are annualized and discounted using the applicable discount rate (published annually by HQUSACE).

(5) Evaluation Procedures for Deep Draft Navigation. The following nine steps are used to estimate deep draft navigation benefits. As in the case of inland navigation benefits, the effort expended on each step will depend on the scope and nature of the proposed improvement, the state of the art to accurately develop the estimates and the sensitivity of project formulation and evaluation to further refinement. Appendix E provides additional guidance for each step.

(a) Step 1 – Determine the Economic Study Area. In this step, the economic study area is delineated. This step includes an assessment of the transportation network that is functionally related to the harbor considered for improvement. Foreign origins and destinations are also included in this assessment. The economic study area is likely to vary for different commodities. In the final delineation of the economic study area, the trade area relative to adjacent ports and any commonality that might exist with the area under study must be considered.

(b) Step 2 – Identify Types and Volumes of Commodity Flow. An analysis of commerce that flows into and out of the economic study area is performed to estimate the types and volumes of commodities that now move on the existing project or that may be attracted as a result of the proposed improvement. This analysis provides an estimate of gross potential cargo tonnage which is used to estimate the prospective commerce that may use the harbor during the period of analysis. Current volumes of prospective commerce are developed using available statistics on waterborne commerce. After determining the types and volumes of commodities currently moving or expected to move in the economic study area, data on origins, destinations and vessel itineraries are used to identify the commodity types and volumes that could benefit from the project. Commodities that are now moving without the project but would shift origins or destinations with the project, as well as induced movements, are segregated for additional analysis.

(c) Step 3 – Project Waterborne Commerce. Projections of the potential use of the harbor or waterway under study are developed for selected years from the time of the study until the end of the period of analysis. The commodities included in the projections should be identified, if possible, according to waterborne modes (e.g., containerized, liquid bulk, dry bulk, etc.) and by imports, exports, domestic shipments, domestic receipts and internal trade. Usually, independent studies are undertaken to develop these projections considering secondary data, data from interviews to shippers, carriers and port officials, opinions of consultants and experts and historical flow patterns. A sensitivity analysis of the projections is performed to account for uncertainties in the estimates.

(d) Step 4 – Determine Vessel Fleet Composition and Cost. The vessel fleet composition is determined by analyzing past trends in vessel size and fleet composition and trends in the domestic and world fleet. The vessel fleet composition is determined for both with- and without-project conditions. Changes in fleet composition may vary by trade route, type of commodity and volume of traffic. Canal restrictions, foreign port depths and lengths of haul also affect the vessel fleet composition. Vessel operating costs, by category of waterborne mode and size, are provided annually by HQUSACE. These costs may be modified to meet the needs of specific studies.

(e) Step 5 – Determine Current Cost of Commodity Movements. Transportation costs prevailing at the time of the study are determined in this step for all tonnage identified in step 2 that could benefit from the project. These costs include full origin-to-destination costs plus handling, transfer, and storage costs, and other accessory charges. Transportation costs are developed for both the with- and without-project conditions. For with-project conditions, these costs reflect efficiencies that can be reasonably expected, such as use of larger vessels, increased loads and reduction in transit time and delays (tides).

(f) Step 6 – Determine Current Cost of Alternative Movement. Alternative movement is the movement of commodities through other competitive harbors, and through other operational means such as lightering, lightening and topping-off operations, off-shore port facilities, transshipment terminals, traffic management, pilotage regulations and other modes of transportation. Transportation costs for these alternative modes of movement, as applicable, are estimated for the with- and without-project condition. These costs are used in the analysis of potential diversion of traffic. Factors to be considered in this analysis, in addition to transportation costs, are handling and transfer charges, available service and schedules, carrier connections, institutional arrangements, and other related factors.

(g) Step 7 – Determine Future Cost of Commodity Movements. Relevant shipping costs are estimated for with- and without-project conditions considering changes in the fleet composition, port delays and port capacity. Future transportation costs are based on the vessel operating costs prevailing at the time of the study.

(h) Step 8 – Determine Use of Harbor and Channel With- and Without-Project. To estimate the proposed harbor use over time, for with- and without-project conditions, the costs for movements via each proposed plan and via each alternative mode are compared. Changes in the cost functions and demand schedules in the current and future without-project condition and the current and future with-project condition are analyzed. The impact of uncertainty in the use of the harbor, the level of service provided and existing and future inventories of vessels are also considered.

(i) Step 9 – Compute NED Benefits. The tonnage moving with and without a project and the cost of movement via the harbor and via each alternative are used to compute total NED benefits for each category of benefits described in paragraph 3-2c(1).

d. Cost Sharing Requirements. Paragraph 2-8 discusses general cost sharing considerations applicable to all project purposes including navigation. Specific cost sharing requirements for this purpose are discussed in Appendix E of this regulation.

(1) Special Cases. Special cases that require a determination of Federal responsibility or cost sharing include, but are not limited to access channels not directly adjacent to primary channels, barge fleeting areas, and an initial single user with potential for future multiple users.

(2) 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.

(3) Land Creation at Harbors (other than inland harbors). The NED Plan for harbor projects that include land creation benefits shall be formulated using navigation benefits exclusively; thus, land creation benefits shall not be considered in the identification of the NED Plan. Special cost sharing will be 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 Appendix E. Non-Federal requests for exceptions to the NED Plan, to include land creation benefits, may be allowed provided all additional implementation costs are non-Federal and the incremental navigation benefits equal or exceed the incremental operation and maintenance costs for the general navigation features. No additional cost sharing will be required for the land creation benefits associated with the project modifications beyond the NED Plan which are requested and paid for by the non-Federal sponsor.

e. Other Authorities. Other authorities that may be applicable to this project purpose are discussed in paragraph 3-10.

3-3. Flood Damage Reduction. Section 1 of the Flood Control Act of 1936 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 also stipulated that for Federal involvement to be justified, “. . . the benefits to whomsoever they may accrue (must be) in excess of the estimated costs, and . . . the lives and social security of people (must be) otherwise adversely affected.”

a. Types of Improvements.

(1) Structural Measures: Structural measures are physical modifications designed to reduce the frequency of damaging levels of flood inundation. Structural measures include: dams with reservoirs, dry dams, channelization measures, levees, walls, diversion channels, pumps, ice-control structures, and bridge modifications.

(2) Nonstructural Measures. Section 73 of the Water Resources Development Act of 1974 requires consideration of nonstructural alternatives in flood damage reduction studies. They can be considered independently or in combination with structural measures. Nonstructural measures reduce flood damages without significantly altering the nature or extent of flooding. Damage reduction from nonstructural measures is accomplished by changing the use made of the floodplains, or by accommodating existing uses to the flood hazard. Examples are flood proofing, relocation of structures, flood warning and preparedness systems (including associated emergency measures), and regulation of floodplain uses.

(3) Major Drainage. Drainage projects are usually undertaken in rural areas to increase agricultural outputs. Some portions of drainage improvements may be considered flood damage reduction measures in accordance with Section 2 of the Flood Control Act of 1944. 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 the 1944 Act if the major outlet works do not substitute for works that are a local responsibility, such as municipal storm sewer improvements.

(4) Groundwater. Section 403 of the WRDA of 1986 expands the definition of flood control to include flood prevention improvements for protection from groundwater induced damages.

b. Specific Policies.

(1) Flood Plain Management, Executive Order 11988. Executive Order 11988 (E.O. 11988) was issued in 1977 with the intent to avoid floodplain development, reduce hazards and risk associated with floods, and restore and preserve natural floodplain values (See [ER 1165-2-26](#) for Corps policy on this directive). In the event there is no alternative to construction in the floodplain, the Corps is required to minimize the adverse impacts induced by construction of the project. In considering adverse impacts, planners should address induced new development in the floodplain or induced improvements to existing development in the floodplain that would increase potential flood damages; and, the detrimental effect of induced activities on natural floodplain values.

(2) Project Performance and Risk Framework.

(a) Flood damage reduction studies are conducted using a risk-based analytical framework. The risk framework captures and quantifies the extent of the risk and uncertainty and enables quantified tradeoffs between risk and cost. Decision making considers explicitly what is gained and what is lost. (See [ER 1105-2-101](#) and [EM 1110-2-1619](#) for details.)

(b) 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 or by inclusions of freeboard. The regulation 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 exceedence 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 and eliminates freeboard to account for hydraulic uncertainty.

(c) There is no minimum level of performance or protection or size required for Corps projects. The smaller in size or the lower the level of performance however, the higher the residual risk. Residual risk must therefore be carefully analyzed, documented and communicated. Departures from the NED plan may be considered options to manage this risk. In addition, explicit risk management alternatives may be formulated.

(3) Existing Levees/Dams. Proposals to modify existing levees must be evaluated using a risk based approach as described in [ER 1105-2-101](#). Downstream consequences of dams on flood risk are also analyzed in a risk-based framework. Evaluation of dam reliability and safety is based on engineering design criteria found in [ER 1110-2-1155](#).

(4) Residual Damages. The analysis of any proposed flood damage reduction project shall include an estimate of the residual expected annual damages that would occur with the project in place.

(5) Induced Flooding. When a project results in induced damages, mitigation should be investigated and recommended if appropriate. Mitigation is appropriate when economically justified or there are overriding reasons of safety, economic or social concerns, or a determination of a real estate taking (flowage easement, etc.) has been made. Remaining induced damages are to be accounted for in the economic analysis and the impacts should be displayed and discussed in the report.

(6) Minimum Flows, Minimum Drainage Area and Urban Drainage. In urban and urbanizing areas provision of a basic drainage system to collect and convey local runoff is a non-Federal responsibility. Water damage problems may be addressed, under flood damage reduction authorities, downstream from the point where the flood discharge is greater than 800 cubic feet per second for the 10 percent 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 the 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 shall not be evaluated using this 1.5 square mile drainage area criterion. Exceptions may be granted in areas of hydrologic disparity, that is areas producing limited discharge for the ten percent event but in excess of 1800 cubic feet per second for the one percent event (See [ER 1165-2-21](#)).

(7) Single Properties. The Corps will not participate in structural flood damage reduction for a single private property. Nor will it participate in nonstructural flood damage reduction measures, unless single property protection is part of a larger plan for structural or nonstructural measures benefiting multiple owners collectively. The Corps may consider participation in structural and nonstructural flood damage reduction measures protecting a single, non-Federal, public property. Work to provide protection to a single Federal property is accomplished only on a reimbursable basis, upon request from the Federal agency. In the event such properties are within the study area, Civil Works funds may be used for their protection.

(8) Recreation at Non-Lake Flood Damage Reduction Projects. The Corps participates in recreation facilities at non-lake flood damage reduction projects if the recreation activities have a strong, direct relationship to the proposed flood damage reduction measures, such as trails along the channel or levee right-of-way. Corps participation in these projects is limited by policy as discussed in Appendix E.

(9) Agricultural Flood Protection. The Corps flood damage reduction programs apply to agricultural as well as urban flood damages. Usually the NED plan for agricultural areas provides only a low degree of flood prevention.

(10) Land Development and Floodplain Management. The following general policy principles apply to land development benefits at structural flood damage reduction projects.

(a) Communities participating in a flood damage reduction project with the Corps of Engineers are required to participate in FEMA's National Flood Insurance Program (NFIP) and to comply with the land use requirements of that program.

(b) Communities participating in a flood damage reduction project with the Corps must also prepare a flood plain management plan designed to reduce the impact of future flood events in the project area. This plan must be adopted within one year after signing a project cooperation agreement and the plan must be implemented not more than one year after the construction of a project. Although costs for the preparation of the flood plain management plan are sponsor costs, data collected during the planning process may be used in development of the plan.

(c) Projects or separable increments producing primarily land development opportunities do not reduce actual flood damages and therefore have low budget priority. Federal participation in these projects will not be recommended.

(d) Flood damage reduction projects can greatly impact what is required of a local community for participation in the NFIP. In addressing these impacts, the following should be considered:

- In coordination with the non-Federal sponsor and FEMA, consideration should be given to developing flood maps and flood profiles depicting post-project conditions. The information should be in a form useful to FEMA in revising flood insurance rate maps.
- The appropriate FEMA Regional office will be notified of proposed flood protection works or of changes to established flood protection works.

(11) Categorical Exemption to NED Plan. For flood damage reduction studies, where the non-Federal sponsor has identified a desired maximum level of protection, where the with-project residual risk is not unreasonably high, and where the plan desired by the sponsor has greater net benefits than smaller scale plans, it is not required to analyze project plans providing higher levels of protection than the plan desired by the sponsor. For example, if a sponsor desires a levee of sufficient height to meet FEMA's flood insurance requirements and it is determined that the levee to accomplish this has higher net benefits than smaller levees, then the levee desired by the sponsor can be recommended without having to analyze larger levees to identify the NED Plan. The recommended plan must have greater net benefits than smaller scale plans, and a sufficient number of alternatives must be analyzed to insure that net benefits do not maximize at a scale smaller than the recommended plan. If the plan proposed to be recommended contains uneconomical increments an exception from the ASA(CW) must be

obtained. An essential element of the analysis of the recommended plan is the identification of residual risk for the sponsor and the flood plain occupants, including residual damages and potential for loss of life, due to exceedence of design capacity. The analysis of alternatives must be comprehensive enough to meet the requirements of NEPA.

(12) Exception to NED Plan for Urban Areas. When the NED Plan has less than 90 percent reliability of protecting against the 1 percent chance annual flood event, an exception to the NED Plan may be recommended. The conditions and requirements stated in Appendix E must be met in order to grant this exception.

(13) Use Of Lands Cleared Under The FEMA Hazard Mitigation Grant Program.
(Guidance is under development)

c. Evaluation Framework. The measurement standard and conceptual basis for benefits associated with flood damage reduction projects 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 evaluation of flood damage reduction projects shall be conducted following the process described in paragraph 2-3e of this regulation. The procedures described in the following paragraphs apply to the estimation of benefits used in the economic evaluation of flood damage reduction projects, and summarize requirements and procedures. Appendix E provides additional guidance on these requirements and procedures.

(1) National Economic Development 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, reflecting three different responses to a flood hazard reduction plan. Inundation reduction benefits are the increases in net income generated by the affected land uses when the same land use pattern and intensity of use is assumed for with- and without-project conditions. Intensification benefits are increases in net income generated by intensified floodplain activities when the floodplain use is the same with and without the project but an activity (or activities) is more intense with the project. The third category of benefits is location benefits. If an activity is added to the floodplain because of a plan, the location benefit is the difference between aggregate net incomes (including economic rent) in the economically affected area with and without the project. The magnitude of location benefits that can be claimed is limited by policy. In general, the NED Plan will be formulated to protect existing development and vacant property that is interspersed with existing development. Location benefits can be claimed for vacant property that is not interspersed with existing development only if it is demonstrated that the vacant property would be developed without the project and the benefits are based on savings in future flood proofing costs.

(2) Types of Flood Damage. Flood damages are classified as physical damages and nonphysical damages. Each activity affected by a flood can experience loss in one or both of these classes.

(a) Physical damages. Physical damages occur to residential, commercial, industrial, institutional, and public property. Damages occur to buildings, contents, automobiles, and outside property and landscaping. Physical damages include the costs to repair roads, bridges,

sewers, power lines, and other infrastructure components. Physical damages also include the direct costs and the value of uncompensated hours for cleanup after the flood.

(b) 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 result in a contribution to national economic development 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 include those expenses resulting from a flood that would not otherwise be incurred. For example, the costs of evacuation and reoccupation, flood fighting, and administrative costs of disaster relief; increased costs of normal operations during the flood; and increased costs of police, fire, or military patrol. Emergency costs should be determined by specific survey or research and should not be estimated by applying arbitrary percentages to the physical damage estimates.

(3) Without-Project Condition. The without-project condition is the land use and related conditions expected to occur during the period of analysis in the absence of the proposed project. The following assumptions are part of the projected without-project condition:

(a) Existing flood hazard reduction plans are considered to be in place, considering the actual remaining economic life of existing structures. If there is a high likelihood of construction of a flood hazard reduction plan authorized for implementation but not yet constructed, the authorized plan is assumed to be in place.

(b) The adoption and enforcement of land use regulations pursuant to the Flood Disaster Protection Act of 1973 is assumed.

(c) For planning purposes, the Corps shall assume that communities in the floodplain belong to the National Flood Insurance Program (NFIP) administered by the Federal Emergency Management Agency (FEMA).

(d) Compliance with E.O. 11988 (described in paragraph 3-3b(1)), Floodplain Management and E.O. 11990, Protection of Wetlands, is assumed.

(4) With-project Condition. The same assumptions that underlie the without-project condition apply to the with-project condition.

(5) Evaluation Procedure. The steps required to evaluate benefits for flood damage reduction projects are described in the following paragraphs. These steps are designed to determine land uses and relate these uses to the flood hazard from an NED perspective. The level of effort expended on each step will depend on the scope and nature of the proposed improvement, the state of the art to accurately develop the estimates and the sensitivity of project formulation and evaluation to further refinement. Appendix E provides additional guidance for each step. The first five steps result in a determination of future land use with emphasis on

evaluating the overall reasonableness of local land use plans with respect to State, County or other projections of a larger area encompassing the study area.

(a) Step 1- Delineate the Affected Area. The area affected by a proposed plan consists of the floodplain plus all other nearby areas likely to serve as alternative sites for any major type of activity that might use the floodplain if it were protected. All areas impacted by the proposed plan shall be included in the affected area.

(b) Step 2 – Determine Floodplain Characteristics. An inventory of the floodplain is undertaken to determine those characteristics that make it attractive or unattractive for particular uses as identified in the land use demand analysis. The floodplain is characterized in terms of flooding, including the designation of high hazard areas, natural storage capabilities and constraints, natural and beneficial values and potential for water-oriented transportation. Other attributes, such as physical characteristics, available services and existing activities are also included in the floodplain characterization.

(c) Step 3 – Project Activities in Affected Area. Economic and demographic projections are developed, as needed, on the basis of current unbiased economic growth indices. Whenever possible, the growth indices should be independent estimates.

(d) Step 4 – Estimate Potential Land Use. Demographic projections are converted to land use needs using conversion factors from published secondary sources, from other studies or from empirical data.

(e) Step 5 – Project land Use – Land use demand is allocated to floodplain and non-floodplain lands for the without-project condition and for each alternative floodplain management plan.

(f) Step 6 – Determine Existing Flood Damages. Existing flood damages are the potential average annual dollar damages to activities affected by flooding at the time of the study. Existing damages are those expressed for a given magnitude of flooding or computed in the damage frequency process. The basis for the determination of existing damages is losses actually sustained in historical floods supplemented by appraisals, application of depth-damage curves and an inventory of capital investment within the floodplain. (Further guidance on the use of generic depth-damage curves is provided in Appendix E.) Average annual damages are computed using standard damage-frequency integration techniques and computer programs that relate hydrologic and hydraulic flood variables such as discharge and stage to damages and to the probability of occurrence of such variables. These estimates are developed using a risk-based analytical framework as described in paragraph 3-3b(2) of this regulation.

(g) Step 7 – Project Future Flood Damages. Future flood damages are those damages to activities identified in Step 3 that might use the floodplain in the future with- and without-project conditions. Hydrologic and economic changes are considered in developing these estimates. Procedures described in step 6 are used to estimate future flood damages. Participation in the NFIP requires communities to preclude new development in the regulatory floodway, as defined by the community. It also requires that new development in the NFIP

regulatory floodplain outside of the floodway be constructed at or above the median probability 100-year discharge regardless of whether or not that discharge is expected to increase in the future during the period of analysis. Estimates of future flood damages are constrained by these requirements.

(h) Step 8 – Determine Other Costs of Using the Floodplain. The impact of flooding on existing and potential future occupants of the floodplain, in addition to flood losses, include increased flood proofing costs, increased costs of administration of the NFIP and less efficient use of existing structures. The increased cost of administration of the NFIP can be claimed as a benefit of flood damage reduction projects. HQUSACE annually publishes data on administration cost per policy to use in estimating this benefit. Increased flood proofing costs are used as a measurement of potential location benefits.

(i) Step 9 – Collect Land Market Value and Related Data. If land use is different with and without the project, the difference in income for the land is computed using flood proofing costs as a proxy of the market value of land. If land use is the same with and without the project but the use is more intense, the increased income is determined on the basis of direct computation of costs and revenues. Projects or separable increments of projects that achieve only land development benefits (protection of vacant lands) are not recommended for implementation.

(j) Step 10 – Compute NED Benefits. To the extent that step 5 indicates that the land use is the same with and without the project, inundation reduction benefits are computed as the difference in flood damages with and without the project. In the evaluation of relocation and evacuation projects considerable attention is paid to the with-project use of the land to be evacuated, as the benefit associated with such use may be crucial for project feasibility. NED benefits also include estimates of savings in administration costs of the NFIP, intensification benefits, location benefits and benefits associated with the use of unemployed or underemployed resources. Detailed procedures for computing NED benefits are provided in Appendix E.

(k) Section 219 of the WRDA of 1999 directs the Secretary of the Army to calculate benefits for nonstructural flood damage reduction projects using methods similar to those used in calculating the benefits of structural projects and further directs the Secretary to avoid double-counting of benefits in these projects. Guidance for the implementation of this Section will be included in Appendix E when finalized.

d. Cost Sharing Requirements. Paragraph 2-8 discusses general cost sharing considerations applicable to all project purposes including flood damage reduction. Specific cost sharing requirements for flood damage reduction are discussed in Appendix E.

e. Other Authorities. Other authorities that may be applicable to this project purpose are discussed in paragraph 3-10.

f. Other Related Programs. Flood Plain Management Services (FPMS)

(1) The FPMS Program was established to carry out Section 206 of the Flood Control Act of 1960 as amended. Its objective is to encourage prudent use of the Nation's flood plains for the benefit of the national economy and general welfare by supporting comprehensive flood plain management planning at all appropriate governmental levels. The Corps may provide flood plain information and planning assistance to State, county and city governments, Native American (Indian) Nations, as well as to other Federal agencies. Flood and flood plain information is also provided to private citizens, corporations, and groups.

(2) Assistance can be provided in the form of technical services, planning guidance and assistance on floods and flood plain issues. The Corps also provides support to the National Flood Insurance Program (NFIP) by conducting flood insurance studies and related technical work. Funding for the FPMS Program is obtained through appropriations for non-reimbursable FPMS items and through cost recovery for reimbursable services. Reimbursements for support to the NFIP are obtained from FEMA. Upon request, program services are provided to State, regional, and local governments, Native American (Indian) Nations, and other non-Federal public agencies without charge. Program services also are offered to other Federal agencies and to the private sector on a 100 percent cost recovery basis.

(3) Coordination. Program activities shall be coordinated with State and local agencies and field offices of Federal agencies concerned with flood problems to ensure that they are informed of the Corps FPMS Program, that the Corps is apprised of related activities of other agencies, and that there is no overlap of effort.

3-4. Hurricane and Storm Damage Reduction. Congress has authorized Federal participation in the cost of restoring and protecting the shores of the United States, its territories and possessions. Under current policy, shore protection projects are designed to reduce damages caused by wind-generated and tide-generated waves and currents along the Nation's ocean coasts, Gulf of Mexico, Great Lakes, and estuary shores. Hurricane protection was added to the erosion control mission in 1956 when Congress authorized cost-shared Federal participation in shore protection and restoration of publicly owned shore areas. Protection of private property is permitted only if such protection is incidental to the protection of public areas, or if the protection of private property would result in public benefits. Federal assistance for periodic nourishment was also authorized on the same basis as new construction, for a period to be specified for each project, when it is determined that it is the most suitable and economical remedial measure.

a. Types of Improvements. The improvements are usually structural measures including such features as beachfill, groins, seawalls, revetment, breakwaters, and bulkheads. Nonstructural measures, such as property acquisition, shall also be considered.

b. Specific Policies.

(1) Geographic Applicability. The shore protection authority is applicable to the shores of the Atlantic and Pacific Oceans, the Gulf of Mexico, the Great Lakes, estuaries, and bays

directly connected therewith of each of the states, the Commonwealth of Puerto Rico, the US Virgin Islands, Guam, American Samoa, and the Commonwealth of the Northern Mariana Islands. The authority extends only that distance up streams where the dominant causes of damage are coastal storms or ocean tidal action (or Great Lakes water motion) and wind-generated waves. The program does not address damages caused by stream flows or vessels.

(2) Erosion Control Measures. In the past, particularly prior to passage of the WRDA of 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. As a result of enactment of the law, however, erosion control has no separate status as a project purpose or as a project output. Thus, erosion control measures (e.g., beach fill) shall be treated as means to the ends of hurricane and storm damage reduction, ecosystem restoration, or recreation; similar to breakwaters or revetments.

(3) Historic Shoreline. Existing authority provides for restoration and protection of beaches. It provides for extending a beach beyond its historic shoreline only when the extension is desirable for engineering reasons, is environmentally acceptable, and is an economically justified means to prevent or reduce storm damage behind the historic shoreline. In the case of multi-purpose projects that include ecosystem restoration as a project purpose, extending a beach beyond its historic shoreline is acceptable if it is environmentally justified.

(4) Formulation and Establishing Corps Participation. Single purpose shore protection projects are formulated to provide hurricane and storm damage reduction. Highest priority is for reducing damages to existing development. Reducing flooding on, or erosion to, undeveloped lands is not a high priority; and Federal participation in protection of privately owned, undeveloped shores, will not be pursued. Recreation is an incidental output.

(a) The Corps participates in single purpose projects formulated exclusively for hurricane and storm damage reduction, with economic benefits equal to or exceeding the costs, based solely on damage reduction benefits, or a combination of damage reduction benefits and recreation benefits. Under current policy, recreation must be incidental in the formulation process and may not be more than fifty percent of the total benefits required for justification. If the criterion for participation is met, then all recreation benefits are included in the benefit to cost analysis. Costs incurred for other than the damage reduction purpose, i.e. to satisfy recreation demand, are a 100 percent non-Federal responsibility.

(b) The Corps also participates in multiple purpose projects formulated for hurricane and storm damage reduction. For multi-purpose projects that include ecosystem restoration as a project purpose, the combined NED/NER Plan will be formulated in accordance with the guidance in paragraph 2-3g(3) and Appendix E of this regulation.

(5) Public Use and its Relation to Federal Participation. Federal involvement in shore protection has developed historically in relation to beaches, generally with efforts to stabilize, create or restore beaches. It is intended that beaches receiving public aid should not provide exclusively private benefits; and therefore, whenever a hurricane and storm damage reduction

project involves beach improvements, public ownership and use of the beach is required. Items related to public use are discussed below.

(a) User Fees. Reasonable beach recreation use fees are allowable when used to offset the non-Federal sponsor share of project costs.

(b) 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 general public (including nonresident users) reasonably near and accessible to the project beaches. In some instances non-Federal plans may encourage or direct substitution of public transportation access for private automobile access.

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

(d) 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.

(e) Public Shores with Limitations. Publicly owned beaches which 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) Shore Lines Owned by Federal Agencies.

(a) Work to provide shore protection to lands under the jurisdiction of another Federal agency shall be accomplished on a reimbursable basis, upon request from the agency. In the event protection has not been requested and such lands are within the study area, Civil Works funds may be used if including them in a project is more cost effective than excluding them.

(b) Protection of (non-Civil Works) Department of the Army lands shall be accomplished with military funds, not civil works funds. If the lands are a minor part within the study area, Civil Works funds may be used if including them in a project is more cost effective than excluding them.

(7) Periodic Nourishment. In accordance with Public Law 826 of 1956 (Beach 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 may consider the periodic nourishment as continuing construction for the length of time that the Chief specifies. Classifying the periodic nourishment as continuing construction establishes the Federal interest in cost sharing renourishments, usually for the economic life of the project. If the NED plan for a shore protection 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 operation and maintenance which is a non-Federal responsibility.

(a) New Projects. 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, (3) fifty years.

(b) Existing Projects. Per authority in Section 934 of the WRDA of 1986, 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. Reevaluation using current evaluation guidelines and policies is necessary. Prior to the expiration of the existing periodic nourishment period the sponsor must request the extension and express a willingness to cost share in accordance with the provisions of WRDA of 1986. This Section 934 authority does not apply to projects using sand bypassing plants.

(8) Outer Continental Shelf Mineral Resources. If mineral resources from the outer continental shelf are proposed for use in Civil Works projects, the Corps and Minerals Management Service (MMS) (U.S. Department of Interior) must enter into a memorandum of agreement. The sponsor must also negotiate a noncompetitive lease with the MMS. Section 215(b) of the WRDA of 1999 amended Section 8(k)(2)(B) of the Outer Continental Shelf Lands Act to exempt state and local government agencies, in addition to Federal agencies, 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.

(9) Specific policies for hurricane and storm damage reduction are presented in more detail in [ER 1165-2-130](#).

c. Evaluation Framework. The measurement standard and conceptual basis for 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 evaluation of hurricane and storm damage reduction projects shall be conducted following the process described in paragraph 2-3e of this regulation. The procedures described in the following paragraphs apply to the estimation of benefits used in the economic evaluation of hurricane and storm damage reduction projects and summarize requirements and procedures. Appendix E provides additional guidance on these requirements and procedures.

(1) National Economic Development Benefits. For hurricane and storm damage reduction projects estimated benefits are principally reductions in actual or potential damages to affected land uses. Damages are most frequently due directly to storms or to the resultant shoreline erosion. Storm damage reduction benefits are categorized as wave damage reduction benefits, inundation reduction benefits and other benefits. Erosion protection benefits include loss of land, structural damage prevention, reduced emergency costs, reduced maintenance of existing structures and incidental benefits. The primary benefit to be claimed in hurricane and storm damage reduction projects is reduction of damages to existing structures. Recreation

benefits are incidental and are measured in accordance with the guidance provided in paragraph 3-7 of this regulation and in Appendix E.

(2) With- and Without-Project Conditions. The assumptions described in paragraph 3-3c(3) are also applicable to hurricane and storm damage reduction studies. In addition, whenever a hurricane and storm damage reduction project involves beach improvements, public ownership and use of the beach is required, as described in paragraph 3-4b(5) of this regulation.

(3) Evaluation Procedure. The steps to evaluate benefits for hurricane and storm damage prevention projects are described in the following paragraphs. The level of effort expended on each step will depend on the scope and nature of the proposed improvement, the state of the art to accurately develop the estimates and the sensitivity of project formulation and evaluation to further refinement.

(a) Step 1 – Delineate the Study Area. The study area is that area affected by storms and erosion problems and by proposed alternatives. It includes areas indirectly affected by the problems and projects such as downdrift areas and navigation and other projects outside the immediate project site.

(b) Step 2 – Define the Problem. In this step, existing storm damage and erosion problems are identified and described. The description of existing conditions should include a history of the economic and social effects of storm damage and erosion problems in the area, a history of storms and erosion trends and historical floods and wave attack problems. A determination of the degree of protection afforded by existing structures is also made as part of this step. This includes an assessment of the level of protection actually provided by the structure, its structural integrity, the remaining useful life and operation and maintenance requirements.

(c) Step 3 – Select Planning Shoreline Reaches. Reaches are the primary economic sub-unit of analysis. Geomorphic conditions, land uses and type or level of existing protection are criteria used in the designation of reaches.

(d) Step 4 – Establish Frequency Relationships. Two types of frequency relationship are developed for the analysis. These are elevation-frequency relationship and erosion-frequency relationship. The first one shows the relationship between wave and water level and frequency of occurrence and is used to derive expected annual inundation damages. The second one shows the relationship between periodic erosion (or accretion) and frequency of occurrence and is used to estimate erosion-induced damages.

(e) Step 5 – Inventory Existing Conditions. An inventory of affected properties, including land, is performed to estimate potential damages. The inventory is done by land use activities (i.e., residential, commercial, industrial, etc.) and includes variables such as value, use, ground elevation, distance from the water, construction materials, area, and number of stories. Areas likely to be developed in the future or where land use changes could occur are also identified.

(f) Step 6 – Develop Damage Relationships. Damage relationships describe the expected value of structural or contents damages caused by various factors, such as depth of flooding, duration of flooding, sediment load, wave heights, amount of shoreline recession and warning time. Generalized or site-specific damage relationships can be used depending on the scope of the study and the availability of applicable generalized relationships. Generalized damage relationships are those developed for other geographic areas with similar characteristics to the study area. Site-specific damage relationships are usually required to estimate wave attack and erosion damages. These damage relationships are developed using actual damage data from past storm events. Estimates of losses for buildings, roads, protective works, and other features are developed at current price levels for existing development. Damage relationships are developed for each land use category. Anticipated damages from land loss due to erosion are computed as the market value of the average annual area expected to be lost. Nearshore land values are used to estimate the value of land lost. A risk-based analytical framework should be used to develop the damage relationships.

(g) Step 7 – Develop Damage-Frequency Relationships. The damage-frequency relationships represent how the damage associated with a given event (i.e., storm, wave, erosion) is related to the frequency of that event (probability of occurrence). The damage relationships developed in step 7 are combined with the frequency curves (developed by the hydraulic and hydrologic engineers) to estimate the damage-frequency relationships. Damage-frequency relationships (curves) are developed for each of the applicable damage mechanisms, i.e., long-term erosion, recession, inundation and wave attack and for each land use category. These relationships should be developed using a risk-based analytical framework.

(h) Step 8 – Calculate Expected Annual Damages and Benefits. The expected annual damage is the expected value of erosion losses and storm damages in any given year. Expected annual damages are calculated by computing the area under the damage-frequency curve using a life-cycle approach. Expected annual damages are calculated for the with- and without-project conditions. The difference between the with- and without-project expected annual damages represents the benefit associated with the project.

d. Cost Sharing Requirements. Paragraph 2-8 discusses general cost sharing considerations applicable to all project purposes including hurricane and storm damage prevention. Specific cost sharing requirements for this purpose are discussed in Appendix E.

e. Other Authorities. Other authorities that may be applicable to this project purpose are discussed in paragraph 3-10.

3-5. Ecosystem Restoration. The Corps of Engineers incorporated ecosystem restoration as a project purpose within the Civil Works program in response to the increasing National emphasis on environmental restoration and preservation. Historically, Corps involvement in environmental issues focused on compliance with NEPA requirements related to flood protection, navigation, and other project purposes. The ecosystem restoration purpose shall be carried out in addition to activities related to NEPA compliance as discussed in Appendix C. Ecosystem restoration features shall be considered as single purpose projects or as a part of multiple purpose projects along with navigation, flood protection and other purposes, wherever those restoration features

improve the value and function of the ecosystem. Ecosystem restoration projects should be formulated in a systems context to improve the potential for long-term survival of aquatic, wetland, and terrestrial complexes as self-regulating, functioning systems. Similar to other project purposes, the value of ecosystem restoration outputs shall equal or exceed their cost.

a. Types of 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 reconnection of 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, removal of drainage structures and or levees to restore wetland hydrology, and restoring conditions conducive to native aquatic and riparian vegetation.

b. Specific Policies.

(1) 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. Indicators of success would 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 a minimum of continuing human intervention. Those restoration opportunities that are associated with wetlands, riparian and other floodplain and aquatic systems are most appropriate for Corps involvement. A more detailed discussion of Corps ecosystem restoration policy is found in [ER 1165-2-501](#) and Appendix E of this regulation.

(2) Purposes. Projects implemented under this guidance should address the restoration of ecosystems and not restoration of cultural or historic resources, aesthetic resources, or clean up of hazardous and toxic wastes.

(3) Mitigation. Ecosystem restoration projects should be designed to avoid the need for fish and wildlife mitigation. Projects implemented using restoration authorities may not be used as wetland banks or mitigation credit for the non-Federal sponsor.

(4) Public interest. For projects where the land on which the majority of the physical ecosystem restoration will occur is in the ownership of a single firm, individual, club, or association with restrictive membership requirements, it must be demonstrated clearly that the restoration benefits are in the overall public interest and that the benefits do not accrue primarily to the property owner.

(5) Land acquisition. Land acquisition in ecosystem restoration plans must be kept to a minimum. Project proposals that consist primarily of land acquisition are not appropriate. As a target, land value should not exceed 25 percent of total project costs. Projects with land costs exceeding this target level are not likely to be given a high priority for budgetary purposes.

(6) Recreational features. Limited recreational features compatible with the ecosystem outputs for which the project is designed are permissible. Recreational features must be justified and appropriately cost-shared, and should not increase the Federal cost of the ecosystem restoration project by more than 10 percent without prior approval of the ASA(CW). (See Appendix E for additional information.)

(7) Water Quality. Water quality is an important component of ecosystem structure and water quality improvement can 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 shall not be recommended for implementation.

(8) Monitoring and adaptive management. Monitoring may be necessary to determine if the predicted outputs are being achieved and to provide feed back for future projects. Cost shared post-implementation monitoring will rarely be required. If cost shared post-implementation monitoring is being considered, it must be clearly defined, justified and the period of cost shared monitoring shall not exceed five years following completion of construction. The cost of monitoring included in the total project cost and cost shared with the non-Federal sponsor shall not exceed one percent of the total first cost of ecosystem restoration features. For complex specifically authorized projects that have high levels of risk and uncertainty of obtaining the proposed outputs, adaptive management may be recommended. The cost of the adaptive management action, if needed, will be limited to 3 percent of the total project cost excluding monitoring costs. Appendix F contains guidance for the CAP.

(9) Real Estate. Requirements specified in paragraph 4-3c(4) apply to ecosystem restoration studies. Generally, fee title is required for ecosystem restoration projects.

c. Evaluation Framework. While the planning process for single purpose ecosystem restoration projects is the same as for any other purpose, the evaluation process is different in that it focuses on quantitative and qualitative restoration outputs and monetary benefits are usually incidental. (See Appendix E for more information on the evaluation process.)

(1) Ecosystem restoration outputs must be clearly identified and quantified in appropriate units. Although it is possible to evaluate various physical, chemical, and/or biological parameters that can be modified by management measures which would result in an increase in ecosystem quantity and quality in the project area, the use of units that measure an increase in "ecosystem" value and productivity are preferred. Some examples of possible metrics which may be used include habitat units, acres of increased spawning habitat for anadromous fish, stream miles restored to provide fish habitat, increases in number of breeding birds, increases in target species and diversity indices. Alternate measures of ecosystem value and productivity may be used upon approval by CECW-P. Monetary gains (e.g., incidental recreation or flood damage reduction) and losses (e.g., flood damage reduction or hydropower) associated with the project shall also be identified.

(2) Cost Effectiveness-Incremental Cost Analyses – As used in this regulation, a plan is considered cost effective if it provides a given level of output for the least cost. Cost effectiveness analysis shall be used to identify the least cost solution for each level of environmental output being considered. Incremental cost analysis compares the additional costs to the additional outputs of an alternative. It is a tool that can assist in the plan formulation and evaluation process, rather than a dictum that drives that process. Incremental 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. These analyses must be performed at an appropriate level of detail for each study to identify the most cost effective plan within the identified constraints.

(3) The significance of the outputs is a critical factor in determining if the monetary and/or 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 concepts of significance and scarcity are discussed in more detail in Appendix E. The risks and uncertainties associated with achieving the projected outputs must also be considered. (See Appendix E for additional information.) Contingent value procedures (survey techniques) for estimating existence, “option”, bequest, or other such non-use values will not be approved, and shall not be used, due to several factors including the conjectural nature of estimated values and the high difficulty in controlling bias.

d. Cost Sharing Requirements. Paragraph 2-8 discusses general cost sharing considerations applicable to all project purposes including ecosystem restoration. Specific cost sharing requirements for this purpose are discussed in Appendix E. Appendix F provides details on cost sharing rules applicable to CAP authorities.

e. Other Authorities. Other authorities that may be applicable to this project purpose are discussed in paragraph 3-10.

3-6. Hydroelectric Power Generation. Congress, through various statutes, has directed the Corps to consider the development of hydroelectric power in conjunction with other water resources development plans. Current policy calls for the Corps to formulate comprehensive plans including the development of hydropower by a non-Federal sponsor. The Corps 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 Corps project are borne by non-Federal sponsors.

a. Types of Improvements.

(1) 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. The Corps does not construct single purpose hydroelectric power projects.

(2) Addition of Hydropower to Existing Projects. Corps projects without hydroelectric power facilities may add facilities through Federal Energy Regulatory Commission (FERC)

licensed non-Federal development. In rare cases, Congress may authorize Federal development. Cost of development must be borne by non-Federal sponsors.

(3) Pumped Storage. Pumped storage may be considered in the formulation of water resource projects. Non-Federal sponsors are encouraged to develop pumped storage facilities determined to be feasible.

b. Specific Policies.

(1) Practicability. A hydropower project is impractical for non-Federal development if there are compelling physical, operational, legal, competing use, institutional, environmental or economic reasons preventing development or operation, or if non-Federal development would be significantly less productive than Federal development (i.e., produce significantly fewer net NED benefits considering all project outputs).

(2) Economic Justification Requirements. Corps development of single purpose hydropower is precluded. In addition, before hydropower can be included in a multiple purpose project, the project must be economically justified based on other outputs (e.g., flood damage reduction or navigation).

(3) Marketing of Federal Hydropower. Although the Corps constructs and operates power facilities, the power itself is either sold by a Federal power-marketing agency or conveyed to a sponsor. Thus, plan formulation, financing and other implementation requirements should be coordinated with the power-marketing agency and sponsors.

(4) Studies. New studies may be conducted in cases where non-Federal development is impractical. This must be substantiated in order to justify a funding request. No single purpose hydropower studies may be initiated for new sites unless specifically directed and funded by the Congress. Non-Federal sponsors must agree to share the costs of the feasibility study with the explicit understanding that any resultant Federal project will be financed by non-Federal funds.

(5) 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). Assistance is limited to technical services. Separate authority to construct or operate and maintain hydropower facilities is required. The Corps Center of Expertise for hydropower projects is the Hydroelectric Design Center (HDC) located in Northwestern Division (NWD). Some technical services must be done by the HDC. Any technical service agreements must be coordinated with HDC.

(6) Minimum Facilities for Future Power Installations. To support future hydropower development, penstocks and some other features ("minimum facilities") may be included in initial project construction, while installation of full facilities is postponed.

(7) Transmission Facilities. The placement of transmission lines and substations must be considered with other project effects.

(8) Hydroelectric Development at Non-Corps Sites. The Corps has no general authority to participate in hydroelectric development at non-Corps sites.

c. Evaluation Framework. The measurement standard and conceptual basis for hydropower 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. In the absence of direct measures of marginal willingness to pay, the benefit can be estimated using the resource cost of the most likely alternative to be implemented in the absence of the alternatives under consideration. Since the Corps current participation on the development of hydropower generation projects is very limited, the evaluation procedures are not summarized in this regulation. (See Appendix E for a detailed description, if needed). Current Corps involvement in hydropower generation projects involves the evaluation of major rehabilitation of existing projects. The procedures to evaluate major rehabilitation projects are also described in Appendix E.

d. Cost Sharing Requirements. Paragraph 2-8 discusses general cost sharing considerations applicable to all project purposes including hydropower. Specific cost sharing requirements for this purpose are discussed in Appendix E.

3-7. Recreation. The U.S. Army Corps of Engineers is one of the Nation's largest providers of outdoor recreation opportunities. Although known primarily for the opportunities managed at its lake projects, the Corps also participates in the planning, design and construction of recreation facilities at a wide variety of other types of water resource projects. Such facilities might include hiking and biking trails associated with a stream channel or levee primarily designed for flood damage reduction. There is no general authority for Corps participation in a single purpose recreation project.

a. Types of Improvements. A list of recreational facilities which may be provided in recreation development at Corps projects is provided in Appendix E. As a general rule, the Corps does not participate in the development of improvements that provide outputs or services generally considered vendible. If there is no non-Federal recreation sponsor, facilities or project modifications may 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.

b. Specific Policies.

(1) Lakes (man-made).

(a) Lakes, or reservoirs, are impoundments created behind dams, or behind navigation locks and dams if lands not subject to navigation servitude are needed for water storage. Recreation policies applicable to lakes are not applicable to dry dams, that is, those dams not providing permanently impounded water. The Federal government may participate in basic

recreation facilities on project lands or separable recreation lands if a non-Federal sponsor will participate and cost share. Economically justified recreation facilities are cost shared 50 percent Federal and 50 percent non-Federal. The same conditions apply to separable lands acquired for future recreation development. Cost of recreation development at lakes may not exceed one-half of total project costs. If recreation is a project purpose, several scales of development must be formulated and evaluated.

(b) Reallocation of Storage. Storage reallocation for recreation which significantly affects other authorized purposes, or involves major structural or operational changes, requires Congressional approval. Costs reallocated to recreation and subject to cost sharing will be set to the highest of benefits foregone, revenues foregone, replacement costs, or updated cost of storage. Appendix E provides detailed information on how to compute these benefits, revenues and costs. Cost sharing of facilities is 50 percent Federal and 50 percent non-Federal.

(2) Non-lake Flood Damage Reduction and Navigation Projects. General policies described in the previous paragraphs also apply to non-lake projects, with the following exceptions:

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

(b) Separable lands acquired for access, parking and facilities, which are required for health and safety are eligible for recreation cost sharing.

(c) Generally, if there is no non-Federally sponsored recreation development, there is no Federal participation in minimum facilities.

(d) The Federal cost of a project including recreation may not exceed the Federal cost of the project excluding recreation by more than ten percent without prior approval by the Secretary of the Army.

(3) Shore Protection Projects. Policy precludes the addition of sand to a beach solely to increase its potential for recreation. Other associated recreation developments are entirely non-Federal responsibility except on Federally-owned shores.

(4) Nonstructural Flood Damage Reduction Projects. Nonstructural flood damage reduction projects are justified mainly by creating new uses for floodplains, and one of the most important new uses is recreation. The limitation of increased Federal cost for recreation development, described in paragraph 3-7b(2), does not apply to projects formulated for nonstructural flood damage reduction that include recreation development. Cost of recreation development may not exceed one-half of the total project costs.

(5) Recreation at ecosystem restoration projects. Recreation at ecosystem restoration projects should 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 should be considered within the framework of the ecosystem restoration project purpose.

Recreation development at an ecosystem restoration project shall be totally ancillary to the primary purpose, appropriate in scope and scale, and shall not diminish the ecosystem restoration outputs used to justify the project. Recreation facilities may be added to take advantage of the education and recreation potential of the ecosystem restoration project but the project shall not be formulated for recreation. 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. The recreational experience shall build upon the ecosystem restoration objective and take advantage of the restored resources rather than detract from them. Ecosystem restoration projects should not encourage public use if there is no non-Federal sponsor to cost share recreation. (Refer to Appendix E for a more detailed discussion on this matter.) Federal participation in recreation development at ecosystem restoration projects will be limited to the facilities shown on the list in Appendix E. Specific policies stated in paragraph 3-7b(2) of this regulation also apply to recreation development at single purpose ecosystem restoration projects. For multi-purpose projects that include non-structural flood damage reduction, ecosystem restoration and recreation, the cost of recreation associated with the non-structural flood damage reduction features may not exceed one-half of the total cost for flood damage reduction plus recreation; and, for recreation associated with ecosystem restoration, the Federal cost of ecosystem restoration plus the Federal cost of recreation may not exceed by more than 10 percent the Federal cost of the ecosystem restoration project without prior approval of the ASA(CW). (See Appendix E for additional information on the implementation of this policy.)

(6) Continuing Authorities. Flood damage reduction, navigation and shore protection continuing authorities are subject to the same recreation policies and conditions of participation as specifically authorized projects. Additionally, all costs in excess of the statutory limitation of Federal expenditures for these projects are entirely a local responsibility.

(7) Limitations on Corps of Engineers Participation in Recreation Projects. Budget Policy generally precludes using Civil Works resources to implement recreation oriented projects in the Civil Works program. An exception is where a project is formulated for other primary purposes and average annual recreation benefits are less than 50 percent of the average annual benefits required for justification (i.e., the recreation benefits that are required for justification are less than an amount equal to 50 percent of project costs).

c. Evaluation Framework. 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 evaluation of recreation projects shall be conducted following the process described in paragraph 2-3e of this regulation. The procedures described in the following paragraphs apply to the estimation of benefits used in the economic evaluation of recreation projects and summarize requirements and procedures. Appendix E provides additional guidance on these requirements and procedures.

(1) National Economic Development Benefits. NED 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 recreational facilities are measured as the with- and without-project willingness to pay.

(2) 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. They are the travel cost method (TCM), contingent valuation method (CVM) and the unit day value method (UDV). Criteria to select the method to use include availability of regional demand model, type of recreation activities affected (general or specialized), estimated annual visits and cost of proposed facilities. Appendix E provides details on how to apply these criteria and on how to estimate benefits using each one these evaluation methods.

(a) Travel cost method. The basic premise of the travel cost method is that per capita use of a recreation site will decrease as out-of-pocket and time costs of traveling to the site increases, other variables being constant. 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.

(b) Contingent Valuation Method. The contingent valuation method estimates NED benefits by directly asking individual households their willingness to pay for changes in recreation opportunities at a given site. Individual values collected may be aggregated by summing willingness to pay for all users in the study area. This method may be applied to a site-specific study or a regional model. Contingent value techniques shall not be used to estimate existence, "option", bequest or other such non-use values, due to several factors including the conjectural nature of estimated values and the high difficulty in controlling bias.

(c) Unit Day Value. The unit day value method relies on expert or informed opinion and judgment to estimate the average willingness to pay of recreational users. By applying a carefully thought-out and adjusted unit day value to estimated use, an approximation is obtained that may be used as an estimate of project recreation benefits. This method may be applied to site-specific studies only.

d. Cost Sharing Requirements. Paragraph 2-8 discusses general cost sharing considerations applicable to all project purposes including recreation. Specific cost sharing requirements for this purpose are discussed in Appendix E.

e. Other Authorities. Other authorities that may be applicable to this project purpose are discussed in paragraph 3-10.

3-8. Water Supply. National policy regarding water supply states that the primary responsibility for water supply rests with states and local entities. The Corps may participate and cooperate in developing water supplies in connection with construction, operation and modification of Federal navigation, flood damage reduction, or multipurpose projects. Certain conditions of non-Federal participation are required.

a. Types of Improvements. The Corps is authorized to provide storage in multipurpose reservoirs for municipal and industrial water supply and for agricultural irrigation. Some facilities for releasing or withdrawing the stored water can be included in the project structure.

The cost of storage and associated facilities must be repaid by the non-Federal sponsor. The Secretary of the Army is authorized to make agreements with states, municipalities and non-Federal entities for right to storage in Corps reservoirs. Storage for agricultural irrigation may be provided at the request of the Secretary of the Interior in 17 Western states as defined in Appendix E. Storage for this purpose can be provided in non-Western states provided cost sharing requirements described in Appendix E are met. Existing Corps projects may be modified to add storage for municipal and industrial water supply. Storage may also be reallocated from other purposes to municipal and industrial uses. Specific policies and procedures applicable to reallocations of storage are discussed in Paragraph 3-8b(5). Permanent reallocations for irrigation water supply may also be considered in existing projects through the submittal of a Section 216 report (Review of Completed Projects) to Congress. Paragraph 3-10b and Appendix G provide more information on Section 216 reports. The Secretary of the Army can also enter into agreements with states, municipalities, private entities or individuals for the use of surplus water as defined in, and under the conditions described in, Paragraph 3-8b(4). Surplus water can also be used to respond to droughts and other emergencies affecting municipal and industrial water supplies.

b. Specific Policies.

(1) Water Rights. 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 State and local interests. The Corps will not acquire water rights necessary for use of stored water. This is a responsibility of the water users. Nor should the Corps 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.

(2) Permanent Rights to Storage. Under the authority of Public Law 88-140 of 1963 (Extension of Right to Water Supply Storage), the non-Federal sponsor acquires a permanent right to the use of storage as long as the space is physically available.

(3) New Projects. Corps 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 sponsor must pay all costs allocated to M&I water supply storage space. Conduits for release or withdrawal of stored M&I water may be designed as an integral part of the dam structure. Costs are identified as specific M&I water supply costs with 100 percent payment of investment and annual costs by users.

(a) Multi-purpose Project. Limits are placed on the percent of municipal and industrial (M&I) water that may be included in a multi-purpose project. To be considered multi-purpose, a project must fall in one of the following categories:

- The project has justified, separable storage for flood damage reduction or navigation or agricultural water supply. In this case the sum of benefits for these purposes must be at least ten percent of total NED benefits. If M&I water supply exceeds 90 percent of total benefits the project is considered single purpose M&I water supply and thus not eligible for Federal participation.

- The project has no separable storage for flood damage reduction, navigation or agricultural water supply. In this case the sum of benefits for these purposes must be at least twenty percent of total NED benefits. If M&I water supply exceeds 80 percent of total benefits the project is considered single purpose M&I water supply and thus not eligible for Federal participation.

(b) Single-Purpose Water Supply. The Corps does not conduct single purpose water supply studies, except for analysis of existing data under Section 22 of the WRDA of 1974 as amended. This constraint does not apply to single purpose water supply modifications to previously constructed projects having flood damage reduction or navigation purposes. Also, the Corps may conduct reimbursable single purpose water supply studies for non-Federal interests under provisions of the Intergovernmental Cooperation Act of 1968.

(c) 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, Corps 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 sponsors shall negotiate a repayment agreement, with payments to begin immediately after construction completion under the provisions of Section 932 of the WRDA of 1986.

(4) Surplus Water. Under Section 6 of the Flood Control Act of 1944, the Secretary of the Army is authorized to make agreements with states, municipalities, private concerns, or individuals for surplus water that may be available at any reservoir under the control of the Department. These agreements may be for domestic, municipal, and industrial uses, but not for crop irrigation. When the user desires long-term use, a permanent storage reallocation should be performed under the authority of the Water Supply Act of 1958, as amended. Surplus water is either water stored in a Department of the Army reservoir that is not required because the authorized use for the water never developed or the need was reduced by changes that occurred since authorization or construction, or water that would be more beneficially used as municipal and industrial water than for the authorized purposes over some specific time period. Use of the Section 6 authority is allowed only where non-Federal sponsors do not want to purchase storage because: use of the water is needed for a short term only or use would be temporary pending development of the authorized use and reallocation of storage is not appropriate. Terms of the agreements are normally for five (5) years, with an option for a five (5) year extension, subject to the space being needed for the authorized purposes, or the authorized purpose is deauthorized.

(5) Reallocation of storage. Reallocation or addition of storage that would seriously affect other authorized purposes or that would involve major structural or operational changes requires Congressional approval. Provided these criteria are not violated, 15 percent of the total storage capacity allocated to all authorized project purposes or 50,000 acre feet, whichever is less, may be allocated from storage authorized for other purposes. Or, this amount may be added to the project to serve as storage for municipal and industrial water supply at the discretion of the Commander, USACE. When reallocating storage from the flood control pool to municipal and industrial water supply, the need to compensate existing water supply contract holders shall be evaluated. Dependable yield mitigation storage (DYMS) shall be analyzed and implemented to

compensate these users. Compensation to existing hydropower users through minor operational changes, where appropriate, may also be considered. Procedures and requirements to analyze and implement DYMS and operational changes are described in Appendix E.

(a) Costs of Reallocated Storage. The cost allocated to the non-Federal entity (i.e., 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. The non-Federal entity shall also be responsible for an appropriate share of the annual costs that include specific and joint-use operation, maintenance, repair, replacement and rehabilitation (OMRR&R) costs. In those cases where the cost of water supply is based on hydropower replacement costs, the OMRR&R increment of such cost is to be deleted from the total charge and then billed separately based on a pro rata share of the actual experienced project costs.

(b) Financial Feasibility. A test of financial feasibility must be performed to demonstrate that reallocation of storage is the most efficient water supply alternative. Appendix E provides additional information on how to conduct this analysis.

(c) 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 sponsor is responsible for 100 percent of the new construction costs allocated to M&I water supply. This is to be paid during the construction period. In addition, payments equal to 50 percent of the sponsor's savings are required.

(6) Seasonal Operations for Water Supply. Congress has not provided general authority for including storage space in Corps projects for seasonal M&I use, either as withdrawals or to improve groundwater supplies. However, project specific authorizations are not precluded. In addition, project operations may be modified to enhance ground water replenishment, to increase downstream flows, or to otherwise enhance usage of projects for M&I purposes. Modifications must be consistent with authorized project purposes and law. Cost sharing requirements for seasonal operations for water supply are provided in Appendix E.

(7) Water Withdrawals Contracts. The Corps will not use Section 501 of the Independent Offices Appropriations Act of 1952 to obtain reimbursement for water supply withdrawals. Existing contracts under this authority should be allowed to expire under the terms of the contract. These contracts are not to be extended.

c. Evaluation Framework. The measurement standard and conceptual basis for 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 evaluation of water supply projects shall be conducted following the process described in paragraph 2-3e of this regulation. The procedures described in the following paragraphs apply to the estimation of benefits used in the economic

evaluation of water supply projects and summarize requirements and procedures. Appendix E provides additional guidance on these requirements and procedures.

(1) National Economic Development 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 resource 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.

(2) With- and Without-Project Condition. Specific elements included in the definition of the without-project condition are 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 six elements are also considered under the with-project condition.

(3) Evaluation Procedure. The steps required to evaluate benefits for water supply projects are described in the following paragraphs. The level of effort expended on each step will depend on the scope and nature of the proposed improvement, the state of the art to accurately develop the estimates and the sensitivity of project formulation and evaluation to further refinement. Appendix E provides additional guidance for each step.

(a) Step 1 - Identify the study area. The study area is the area within which significant project impacts will accrue from the use of M&I water supplies, including areas that will receive direct benefits and/or incur costs from the provision of M&I water supply.

(b) Step 2 - Estimate future M&I water supplies. All sources of supply expected to be available to the M&I user are analyzed. The analysis is performed by time period and includes existing water supplies, institutional arrangements, additional water supplies, probability of water supply and water quality.

(c) Step 3 - Project future M&I water supply. Future water use is projected by sector considering seasonal variations in use. The projections are based on an analysis of the factors that may determine variations in levels of water use.

(d) Step 4 – Identify the deficit between future water supplies and use. Projected water use is compared to future water supplies to determine whether any deficits exist in the study area. An analysis of the intensity, frequency and duration of the expected deficits is performed.

(e) Step 5 – Identify alternatives without the Federal plan. Alternative plans that are likely to be implemented by communities and/or industries in the absence of a Federal plan are identified in this step. These plans should be identified through analysis of the total water resources of the region, allowing for present and expected competing uses.

(f) Step 6 – Rank and display the alternative plans based on least cost analysis. All the alternatives are ranked in order from the highest cost alternative to the lowest. Annualized costs for each alternative are calculated on the basis of the service (depreciable) life of the facility or the period of analysis, whichever is less.

(g) Step 7 – Identify the most likely alternative. The least cost alternative is identified as the most likely alternative.

(h) Step 8 – Compute M&I water supply annualized benefits. The annualized benefits of the Federal supply plan are equal to the annualized cost of the most likely alternative.

(i) Risk-analysis techniques, required for all water resources studies, have not been specifically developed for municipal and industrial water supply projects. 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.

d. Cost Sharing Requirements. Paragraph 2-8 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.

e. Other Authorities. Other authorities that may be applicable to this project purpose are discussed in paragraph 3-10.

3-9. Multiple Purpose Studies.

a. Definition. Multiple purpose studies can examine more than one type of water resources problem or opportunity and recommend projects with more than one purpose. Corps mission areas can be combined to address multiple objectives within the localized study area. For example, many existing flood control dams also supply water for 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.

b. 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 Corps main mission areas (flood damage reduction, ecosystem restoration or navigation). Non-Federal entities with interests common to the Corps 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 Corps studies and projects.

c. **Watershed Studies.** Watershed studies are planning initiatives that have a multi-purpose and multi-objective scope and that 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, flood management activities, and regional economic development. This multi-purpose approach is recommended since numerous entities within the boundaries of any watershed must agree with and support watershed improvement and management initiatives in order 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 in order to achieve the needs and opportunities identified in the study. The watershed resources management plan may or may not identify further Corps studies or implementation projects.

d. **Cost Sharing Requirements.** Multiple-purpose studies and projects are cost shared in accordance with 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 the Corps for allocating costs of multiple purpose projects. Detailed cost allocation procedures are discussed in Appendix E.

(1) **Cost Allocation.** The need for cost allocation stems from pricing and cost-sharing policies that vary among purposes. Cost allocation is the process of apportioning 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.

(2) **Cost Allocation Standard.** Cost sharing policies may differ for construction costs and other costs such as operation, maintenance, repair, replacement and rehabilitation costs. Allocations for each one of these types of costs shall be made, as applicable, to the particular project. The Separable Costs/Remaining Benefits (SCRB) method shall be used for the allocation of costs among project purposes. Costs allocated to each purpose are the sum of the separable cost for the purpose and a share of joint cost. Joint costs may be allocated among purposes in proportion to remaining benefits. They may also be allocated in proportion to the use of facilities, provided that the sum of allocated joint cost and separable cost for any purpose does not exceed the lesser of the benefit or the alternative cost for that purpose. The SCR method is also applicable for multi-purpose projects that include ecosystem restoration as a project purpose. Guidance on this application is under development. If the need for a cost allocation analysis for this type of project is foreseen, contact CECW-PD for additional guidance, preferably during the early phases of the study.

3-10. Other Authorities.

a. Continuing Authorities Program (CAP). The planning principles, guidelines and process described in previous chapters also apply to studies conducted under the Continuing Authorities Program. Specific guidance and planning requirements for studies conducted under each section included in the Program is provided in Appendix F. The following sections are included under the Continuing Authorities Program:

- Section 14, Flood Control Act of 1946, as amended, for emergency streambank and shoreline protection for public facilities and services
- Section 103, River and Harbor Act of 1962, as amended, for protecting the shores of publicly owned property from hurricane and storm damage
- Section 107, River and Harbor Act of 1960, as amended, for navigation
- Section 111, River and Harbor Act of 1968, as amended, for mitigation of shoreline damage caused by Federal navigation projects
- Section 204 of Water Resources Development Act of 1992, as amended, for beneficial uses of dredged material
- Section 205, Flood Control Act of 1948, as amended, for flood damage reduction
- Section 206 of Water Resources Development Act of 1996, as amended, for aquatic ecosystem restoration
- Section 208, Flood Control Act of 1954, as amended, for snagging and clearing for flood damage reduction
- Section 1135 of Water Resources Development Act of 1986, as amended, for project modifications for improvement of the environment

b. Review of Completed Projects. Section 216 of the River and Harbor and Flood Control Act of 1970 authorizes investigations for modification of completed projects or their operation when found advisable due to significantly changed physical or economic conditions and for improving the quality of the environment in the overall public interest. Initial appraisal reports are prepared under Section 216 using operations and maintenance (O&M) funds. The cost of preparing the initial appraisal report is limited to \$20,000. Results from this report can be used to support initiation of a reconnaissance study through normal budgetary process. Following the initial appraisal, the 216 study process is of the same as a normal General Investigations study. A feasibility study under Section 216 authority would be appropriate for large scale ecosystem restoration projects linked to existing Civil Works projects, but whose costs would be too large for Section 1135, Section 206, or Section 204 authorities. Additional guidance can be found in [ER 1165-2-119](#).

c. Planning Assistance to States (PAS). The PAS Program is carried out in accordance with the provisions of Section 22 of the WRDA of 1974 as amended. This law authorizes the Chief of Engineers to cooperate with states, the District of Columbia, the Commonwealth of Puerto Rico, the US Virgin Islands, Guam, American Samoa, the Commonwealth of the Northern Mariana Islands, and Federally recognized Native American (Indian) Nations in preparing plans for the development, utilization, and conservation of water and related land resources of drainage basins, watersheds or ecosystems located within the boundaries of the State or Indian lands. Assistance is provided on the basis of specific requests rather than through Congressional study authorization. (See Appendix G for details on the implementation of this program).

d. Flood Mitigation and Riverine Restoration. Section 212 of the WRDA of 1999 provides programmatic authority for the Secretary of the Army to implement projects that reduce flood hazards and restore the natural function and values of rivers within certain specified limits. The program emphasizes the use of nonstructural approaches to flood damage reduction and coordination with FEMA and other Federal, State, and local agencies, and Native American Nations. Projects must significantly reduce potential flood damages, improve the quality of the environment and be justified considering all costs and beneficial outputs. Funds are authorized to be appropriated in fiscal years 2001 through 2005. Additional guidance for this program is under development.

ER 1105-2-100
22 Apr 2000

CHAPTER 4

Types of Studies, Reports and Procedures

4-1. Types of Studies and Reports. The process by which projects are formulated and evaluated is one step in the larger project delivery process. In addition to formulation and evaluation, the project delivery process includes the preparation of the decision document, and the technical and policy reviews of that document and its supporting material. It is intended that the production and reviews of planning decision documents also reflect the same common sense approach as described in the Introduction to Chapter 2. Planning decision documents should be prepared in a timely and cost-effective manner, consistent with the size and complexity of the project. Likewise, the time and effort spent in technical and policy review and in responses to review comments should reflect the size and complexity of the project. Wherever possible, technical and policy review should be incorporated positively and proactively into early phases of the planning and documentation processes and throughout these processes, rather than at the end. Planning studies and reports planning are:

a. Pre-authorization Studies and Reports. Studies for project authorization are undertaken in response to either a study-specific authority or a general authority. Study-specific authorization may be a resolution from the House Committee on Public Works and Transportation, a resolution from the Senate Committee on the Environment and Public Works, or included in a public law. General authorities are contained in Section 216 of the Flood Control Act of 1970 and Section 2 of the Fish and Wildlife Coordination Act of 1958. Section 216 authorizes investigations for modification of completed projects or their operation. Section 2 allows investigation of modifications to projects that were not substantially completed prior to August 1958 in the interest of conservation of fish and wildlife. These studies and reports are funded with General Investigations (GI) funds. Studies under these authorities are conducted in two phases in accordance with the WRDA of 1986.

(1) Reconnaissance Phase. The objectives of the Reconnaissance Phase are to: (1) determine if the water resource(s) problems warrant Federal participation in feasibility studies, (2) define the Federal interest, (3) complete a 905(b) Analysis (refers to Section 905(b) of the WRDA of 1986) or a Reconnaissance Report, (4) prepare a Project Management Plan (PMP), (5) assess the level of interest and support from non-Federal entities, and (6) negotiate and execute a Feasibility Cost Sharing Agreement (FSCA). This determines whether or not planning to develop a project should proceed to the more detailed feasibility stage. The reconnaissance phase is Federally funded and the target for completion is 6-12 months from initial obligation of reconnaissance funds to a signed Feasibility Cost Sharing Agreement.

(2) Feasibility Phase. The objective of feasibility studies is to investigate and recommend solutions to water resources problems. Cost of feasibility studies, except single purpose inland navigation studies, are 50 percent Federal and 50 percent non-Federal as defined in Section 105 of the WRDA of 1986. Typical studies should be completed in 18-36 months. The results of these studies are documented in a feasibility report that includes documentation of environmental compliance. (See Appendix G for additional information on the content of the feasibility report.)

b. Post Authorization Studies and Reports. These planning studies and reports are generally funded as a part of engineering and design studies under the General Investigation appropriation. These studies are undertaken pursuant to project specific construction authorities. Construction authorities imply the authority to undertake reevaluation studies. Studies may be necessary if a significant period of time has elapsed or conditions have changed significantly since the feasibility study was completed. The reports described below shall be used to support post authorization changes provided they include the specific information outlined in Appendix G, paragraph G-16.

(1) General Reevaluation. This is reanalysis of a previously completed study, using current planning criteria and policies, which is required due to changed conditions and/or assumptions. The results may affirm the previous plan; reformulate and modify it, as appropriate; or find that no plan is currently justified. The results of the study are documented in a General Reevaluation Report (GRR).

(2) Limited Reevaluation. This study provides an evaluation of a specific portion of a plan under current policies, criteria and guidelines, and may be limited to economics, environmental effects or, in rare cases, project formulation. A Limited Reevaluation Report (LRR) documents the results of the analysis undertaken.

(3) Design Documentation Reports (DDR) and Engineering Documentation Reports (EDR). During the Preconstruction, Engineering and Design (PED) phase, districts will prepare a Design Documentation Report (DDR) which is a record of final design after the feasibility phase. The DDR provides the technical basis for the plans and specifications and serves as a summary of the final design. An Engineering Documentation Report (EDR) may also be prepared to support the PCA when there are minor changes in design and costs from the authorizing reports. The EDR may also be used in lieu of a GRR to document other information not included in a decision document when project reformulation is not required and the changes are only technical changes. Requirements for preparation and processing of these reports are stated in [ER 1110-2-1150](#). If reformulation of plans is required during PED, then districts shall prepare a GRR or LRR, as described in paragraphs 4-1b(1) and 4-1b(2). Per guidance contained in [ER 1110-2-1150](#), GDM's and DM's will no longer be prepared.

(4) National Environmental Policy Act (NEPA) Documentation. The scope and nature of the changes in the environmental effects of the project identified as a result of acquisition of new information, of changed conditions, or changes in the project will determine the appropriate type of NEPA documentation. Options include an Environmental Assessment which may result in a Finding of No Significant Impact or a Supplemental Environmental Impact Statement. Guidance regarding NEPA documentation is contained in [ER 200-2-2](#)

c. Other Types of Studies and Reports.

(1) Studies of Water Resources Needs of River Basins and Regions. Section 729 of WRDA of 1986 authorizes the Corps of Engineers to study the water needs of river basins and regions of the United States, in consultation with State, interstate and local governmental entities. Section 729 studies may result in recommendations for more detailed feasibility studies, but this

is not required. Section 729 studies should not result in recommendation of projects for Congressional authorization.

(2) Flood Insurance Studies. See guidance in paragraph 3-3f of this regulation and in Appendix G.

(3) Planning Assistance to States Studies. Guidance on Planning Assistance to States (Section 22) studies is in paragraph 3-10c of this regulation and in Appendix G.

(4) Continuing Authorities Program (CAP) Studies. The planning [Principles and Guidelines](#) described in previous chapters apply to studies conducted under the Continuing Authorities Program. However, due to specific legislative requirements, the guidance for each authority must be referenced. This guidance is contained in Appendix F of this regulation.

(5) Section 216 - Review of Completed Projects. See guidance in paragraph 3-10b of this regulation and in [ER 1165-2-119](#).

(6) Congressional Adds. The requirements and processes described in this chapter apply to Congressionally added studies unless specific instructions otherwise are provided through the budget process.

d. Deauthorization. The review of studies and projects to determine eligibility for deauthorization is covered in Paragraph 4-7.

22 Apr 2000

4-2. Corps of Engineers Final Approval Authorities. The table below summarizes the approval responsibilities for the different planning products.

Table 4-1, Corps of Engineers Final Approval Authorities

PLANNING PROGRAM Study Phase/Product	APPROVAL RESPONSIBILITIES		
	District	Division	Headquarters (HQUSACE)
GENERAL INVESTIGATIONS:			
Section 905(b) Analysis			X
Reconnaissance Report			X
Project Management Plan	X		
Feasibility Cost Sharing Agreement ²	X		
Feasibility Report			X ¹
Section 729 Report			X
CONTINUING AUTHORITIES (Sections 14, 103, 107, 111, 204, 205, 206, 208, 1135)			
Preliminary Restoration Plans		X	
Feasibility Cost Sharing Agreement ²		X	
Planning Design Analysis Documentation		X	
Detailed Project Report		X	
PLANNING ASSISTANCE TO STATES	X		
FLOODPLAIN MANAGEMENT SERVICES	X		
POST-AUTHORIZATION REPORTS:			
General Reevaluation Report ¹			X
Limited Reevaluation Report		X	
Major Rehabilitation Reports			X
REPORTS FOR PROJECTS AUTHORIZED SUBJECT TO A SECRETARIAL FINDING³			

¹ Coordinated with ASA(CW).

² If deviation from model agreement, HQUSACE approval required.

³ ASA(CW) approval required.

4-3. Procedures for Studies and Reports.

This section provides guidance for studies for projects requiring specific authorization. Additional guidance is found in Appendix G.

a. Reconnaissance Phase. The reconnaissance phase commences with the obligation of appropriated reconnaissance funds, and terminates with the execution of a Feasibility Cost Sharing Agreement (FCSA) or the division commanders' public notice for a report recommending no Federal action. The products are a 905(b) Analysis report, a Project Management Plan, a letter of intent from the non-Federal sponsor, and a feasibility cost sharing agreement (FCSA).

(1) Reconnaissance Study Period. The reconnaissance study and the Section 905(b) Analysis, part of the reconnaissance phase, begins with the obligation of appropriated reconnaissance funds. The target for completing the reconnaissance phase or the signing of the FCSA for the 905(b) Analysis is 6-12 months. The cost of reconnaissance studies generally is limited to \$100,000.

(2) 905(b) Analysis Report. This report documents the results of the analyses conducted during the reconnaissance phase. The report shall include a preliminary analysis of Federal interest, costs, benefits, environmental impacts, and an estimate of the costs of preparing a feasibility report. The analyses conducted shall be based on existing, readily available data and professional and technical judgement. The 905(b) Analysis Report is prepared by the district and approved by HQUSACE. Additional details on the content and procedures for the 905(b) Analysis Report are provided in Appendix G.

(3) Project Management Plan (PMP). The Project Management Plan (PMP), prepared and negotiated during the reconnaissance phase, documents the Federal and non-Federal efforts required to conduct the feasibility phase. The PMP will ensure that the work required for the feasibility phase has been carefully developed and considered. The PMP forms the basis for estimating the total study cost and non-Federal sponsor share. It also is the basis for assigning tasks between the Corps and the sponsor and for establishing the value of in-kind services. While developing the PMP, the District Commander must discuss with the prospective non-Federal sponsor(s) the objectives of the feasibility study, necessary level of detail, cost of studies, and scheduling of activities for the feasibility study. During negotiations the prospective non-Federal sponsor must be informed that the level of accuracy of alternative plan evaluation and cost estimates to be developed in the feasibility study will depend on the extent of uncertainties and the depth of investigations made during the feasibility study. The Division will ensure that the PMP receives appropriate review.

(4) Feasibility Cost Sharing Agreement (FCSA). The Feasibility Cost Sharing Agreement documents the commitments of the Department of the Army and a non-Federal sponsor to share the cost of the feasibility phase. The FCSA is intended to promote a partnership for the conduct of the feasibility study. The Department of Army remains responsible for representing the Federal interest by following Federal policies and budgetary priorities. Both parties will conduct planning within the framework established by the P&G with guidance

provided in this regulation. The FCSA will be accompanied by a signed Certification Regarding Lobbying and, if applicable a completed Disclosure of Lobbying Activities.

b. Feasibility Phase. The feasibility phase starts with the issuance of initial Federal feasibility funds, following execution of the FCSA, and terminates on the date the feasibility report is submitted to the Office of Management and Budget by the Assistant Secretary of the Army for Civil Works (ASA (CW)) for review of consistency with the policies and programs of the President. The feasibility phase may also be terminated if it is determined that there is no clear Federal interest in a project or if no project would meet the current policies or budget priorities. (See paragraph 4-3c(6)) The products of the phase are a Feasibility Report, including NEPA documentation, and a Chief of Engineers Report.

(1) Feasibility Phase Cost. The total cost of the feasibility phase will be established through negotiation of the PMP. The cost estimate in appropriate Code of Accounts format will identify major costs by task and by type, and be fully supported and documented.

(2) Feasibility Report. A suggested outline for the feasibility report is provided in Appendix G. The feasibility report should document the planning process and all assumptions and rationale for decision making. The report will present the recommended plan and, if applicable, the degree of, and rationale for, departure from the NED plan, the NER Plan or the Combined NED/NER Plan. The non-Federal sponsor cost sharing requirements, including their responsibilities for implementation and operation of the project must be clearly documented. Two project cost estimates shall be displayed in the feasibility report; one based on constant dollars and one based on projected inflation rates. If there is no acceptable plan, the study should be terminated and guidance obtained from CECW-P. For deviations from the NED, NER or Combined NED/NER, the following additional documentation is required.

(a) If the recommended plan is smaller in scope and costs than the NED, NER or Combined NED/NER, the feasibility report will document the rationale for lack of sponsor support for these plans, as applicable, available facts regarding how and why the LPP is less costly and still provides high-priority outputs, information to show that alternative non-Federal funding sources are not available and the analysis performed. (This information shall be provided to HQUSACE thru the MSC for approval prior to submittal of the feasibility report. It will be included in the feasibility report to document and support the decision recommend the LPP.) In all cases, the recommended LPP must have greater net benefits than smaller scale plans. The feasibility report shall include documentation to demonstrate that sufficient alternatives were formulated and evaluated to insure that net benefits do not maximize at a scale lower than the LPP and to meet the requirements of NEPA. A detailed analysis and description of the NED, NER or Combined NED/NER plans, including a detailed final cost estimate for these plans, are not required and do not need to be documented in the feasibility report. The consequences of lost opportunities associated with implementing a LPP including residual risks and potential solutions to other water resource needs and opportunities that may be foregone will also be documented in the feasibility report. Additional documentation requirements for categorical exemptions applicable to flood damage reduction and navigation projects are discussed in paragraphs 3-3b(11) and 3-2b(10).

(b) If the LPP is larger in scale and costs than the NED, NER or Combined NED/NER plans, then a detailed analysis and description must be developed and presented for both the selected plan and the NED plan. The incremental benefits and costs of the LPP, beyond the NED, NER or Combined NED/NER plans, must be analyzed and documented in the feasibility report. The rationale for selection of the LPP must be clearly documented in the feasibility report.

(3) Environmental Compliance Documentation. Documentation of compliance with applicable environmental laws and regulations must be prepared. This may include items such as biological assessments required by the Endangered Species Act and the Fish and Wildlife Coordination Act Reports, in addition to NEPA documents. In accordance with [ER 200-2-2](#), the NEPA document, either an EA or EIS, may either be a self-supporting document combined with and bound within the feasibility report or integrated into the text of the feasibility report. The EA/EIS should generally be integrated into the text of the report unless complex environmental impacts preclude this alternative. Additional information on environmental compliance documentation is in Appendix C.

c. General Requirements for Reconnaissance and Feasibility Phases.

(1) Study Expansion. Expansion of a study's geographic extent or purposes beyond those specified in the congressional authorization is not allowed without additional congressional authority. Where existing congressional authority is not a constraint, guidance on expansion of cost or scheduling should be requested from the Division.

(2) Interagency Coordination. In the interest of improving interagency coordination on planning studies, and of avoiding issues arising late in the planning process, the following procedures apply:

(a) Appropriate Federal and non-Federal agencies shall be invited to participate in the Reconnaissance Review Conference (RRC), Issue Resolution Conferences (IRC), Feasibility Scoping Meeting (FSM), and the Alternative Formulation Briefing (AFB), as deemed appropriate. These conferences are discussed in Appendix G.

(b) Appropriate Federal and non-Federal agencies shall have opportunity for participation in developing the PMP.

(c) Federal agencies shall be invited to be cooperating agencies as defined by NEPA. Cooperating agencies are agencies with jurisdiction by law or with special expertise that qualify them to participate in a study (see 40 CFR 1508.5, Regulations Implementing the Procedural Provisions of the National Environmental Policy Act of 1969, as amended).

(d) All issues involving other agencies (concerns or non-agreement) should be raised and discussed in a separate section of the Memorandum for the Record (MFR) of the meetings held during the planning process. Issues that can not be resolved at the local or regional level will be sent forward for resolution at the Washington level.

(3) Engineering Level of Detail in Reconnaissance and Feasibility Reports. The scope and complexity of engineering analyses shall be commensurate with the size and complexity of the project being evaluated. The level of detail of the engineering efforts during the feasibility phase and the required content of the Engineering Appendix are discussed in [ER 1110-2-1150](#).

(4) Real Estate. The Real Estate Division shall be included as part of the team early in the planning process. The analysis of the nature and extent of real estate requirements must be conducted in accordance with Chapter 12 of [ER 405-1-12](#), including consideration and identification of the specific interests, estates, and acreage required for the project.

(5) Cost Estimating. All cost estimates required to support Civil Works projects will be prepared in accordance with [ER 1110-2-1302](#), Engineering and Design, Civil Works Cost Engineering.

(6) No Implementable Plan.

(a) The District Commander shall ensure that the sponsor is fully aware that the feasibility study may be terminated if there is no clear Federal interest in a project or if no project would meet the current policies or budget priorities. If the non-Federal sponsor wishes to continue the feasibility study under the terms of the FCSA, continuation will be considered on a case-by-case basis. In reaching this decision, consideration should be given to the value of the feasibility study in identifying project alternatives that reflect the sound planning principles set forth in the [Principles and Guidelines](#). The sponsor shall also be made aware that, the feasibility study may be terminated by either party under the provisions of Article X "Termination of Suspension" of the FCSA.

(b) For those reconnaissance or feasibility studies where there is no potential for a Federally implementable plan, the District Commander will stop all work and notify the Division Commander to facilitate revocation of existing funds, adjustments in budget requests and possible study reclassification except as set forth below. Criteria for making the necessary determination are: (1) the plan is not in the Federal interest, based on current Army policies; (2) the plan does not meet technical requirements for selection as set forth in the P&G and elsewhere in this ER, or; (3) non-Federal interests either do not support the plan or do not intend to provide the necessary local cooperation. If based on these criteria, no Federal action is recommended, a final report to the Congress (usually a letter report) will be prepared, regardless of whether the study is terminated in the reconnaissance or feasibility phase.

(c) Watershed studies may or may not result in identifying further Corps studies or implementation projects. Thus, the procedures specified in paragraphs 4-3c(6)(a) and (b) are not applicable to watershed studies.

(7) Responsibility for Reports. District commanders are responsible for reports, including their content; and for the presentation of reports and findings to higher authority.

d. Washington Level Processing. Procedures for processing reports and decision documents are discussed in Appendix H.

4-4. Quality Control/Quality Assurance and Policy Review of Feasibility Reports.

a. General Requirements. Feasibility reports will be reviewed for technical quality and policy compliance. Independent technical and legal reviews are the responsibility of the districts, and District Commanders are responsible for the quality and accuracy of the study processes. HQUSACE is responsible for policy review and approval for decision documents requiring Congressional authorization or ASA(CW) approval. This review will focus on the underlying assumptions, conclusions, recommendations and analyses in the context of established policy and guidance. For all other decision documents covered in this regulation, districts will be responsible for policy quality control and MSCs will be responsible for policy quality assurance. The QC/QA process will be fully documented. Documentation and certification of technical/legal review will accompany the reports that are submitted for HQUSACE policy compliance review.

b. Quality Control. Districts shall prepare a quality control (QC) plan for each product/project which will describe the procedures that will be used to ensure compliance with all technical and policy requirements. The QC plan is a component of the PMP. The District Commander shall approve QC plans. Technical review is the process that confirms the proper selection and application of established criteria, regulations, laws, codes, principles, and professional procedures to ensure a quality product. Technical review also confirms the constructability and effectiveness of the product and the utilization of clearly justified and valid assumptions and methodologies.

c. Quality Assurance. MSCs are responsible for evaluating and recommending changes to the district's QC process. The MSCs' QA process will assure that the QC plan for the project is appropriate. The overall goal of the QA process is to assure that the districts are able to plan, design, and deliver quality projects on schedule, within budget and acceptable to the customer and the Federal Government. Division Commanders shall approve QA plans.

d. Policy Compliance Review. The process for accomplishing policy compliance shall begin with study initiation, and proceed in partnership among the district, MSC and Headquarters until project authorization. Districts are responsible for policy compliance. MSCs are responsible for assuring policy compliance. This process is intended to assure that policy issues are raised and resolved as early as possible in the study, and that final policy compliance reviews of decision documents reflect the success of that process. If policy problems or conflicts are not raised and resolved until the final policy compliance review rather than during the study, the policy partnership between the district, MSC and Headquarters shall be considered a failure.

(1) Compliance Support. Policy compliance support will be available to districts and MSCs on all studies leading to decision documents from initiation to completion. For feasibility studies leading to pre-authorization decision documents, support shall include a preliminary policy compliance review as part of a formal Alternative Formulation Briefing (AFB). The AFB will be scheduled prior to the selection of the recommended plan during the study. It will result in an AFB Project Guidance Memorandum (PGM) describing all policy issues and their

resolution. Subsequent discussions and resolutions of these issues and any additional issues shall be handled through a modification to this AFB PGM.

(2) Compliance Review, Approval and Certification. Headquarters shall be responsible for the policy review, approval and certification of all decision documents requiring Congressional authorization or ASA(CW) approval. Policy review involves the analysis of decision factors and assumptions used to determine the extent and nature of Federal interest, project cost sharing and cooperation requirements, and related issues. Policy compliance review shall ensure that established policy and procedures are applied uniformly nationwide and identifies policy issues that must be resolved in the absence of established criteria, guidance, regulations, laws, codes, principles and procedures or where judgment plays a substantial role in decision making. Policy compliance review also shall ensure that the proposed action is consistent with the overall goals and objectives of the Civil Works program. The final approval and certification of decision documents for policy compliance shall incorporate the AFB PGM and its approved modifications, with sufficient review to assure that documents remain consistent with policy; this shall not constitute a new or independent policy review. Appendix H discusses in detail the policy compliance review process.

4-5. Post-authorization Changes. This section provides guidance for making changes to uncompleted authorized projects. An authorized project is defined as a one specifically authorized by Congress for construction, generally through language in an authorization or appropriation act, or a project authorized pursuant to Section 201 of the Flood Control Act of 1965. Depending on the nature and scope of the changes, a General Reevaluation Report or Limited Reevaluation Report will be required as discussed in paragraphs 4-1b(1) and 4-1b(2) and Appendix G.

a. Addition of Project Purposes. General authorities allow for the addition of project purposes, under certain circumstances, without specific congressional authorization. These purposes include water supply, recreation, fish and wildlife enhancement (except for land acquisition), and low flow augmentation for purposes other than water quality. Additionally, there is authority for adding minimum provisions for future hydroelectric power, and conservation of threatened and endangered species. (See Appendix G for additional information.)

b. Authorized Maximum Cost of Projects. Section 902 of the WRDA of 1986, as amended, legislates a maximum total project cost. Projects to which this limitation applies and for which increases in costs exceed the limitations established by Section 902, as amended, will require further authorization by Congress raising the maximum cost established for the project. No funds may be obligated or expended nor any credit afforded that would result in the maximum cost being exceeded, unless the House and Senate committees on Appropriations have been notified that Section 106 of the Energy and Water Development Appropriations Act of 1997 will be utilized. The maximum project cost allowed by Section 902 includes the authorized cost (adjusted for inflation), the current cost of any studies, modifications, and actions authorized by the WRDA of 1986 or any later law, and 20 percent of the authorized cost (without adjustment for inflation). See Appendix G for detailed procedures to calculate these costs.

4-6. Planning Assistance to States (PAS). Within personnel and funding capabilities, commanders shall cooperate with entities requesting assistance under the PAS program by

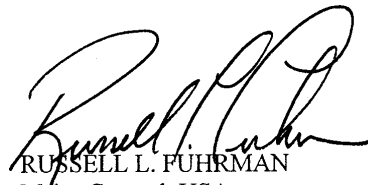
providing planning assistance in an effective and timely manner and in accordance with the guidelines in this regulation (see Appendix G). The Corps may provide technical assistance to support State preparation of comprehensive water and related land resources development plans, including watershed and ecosystem planning and help in conducting individual studies supporting the State water plan. A process of review and evaluation of State work requests and the State water plan determines eligibility for participation in the program. Because of the limited funds available under the PAS Program and because the cost sharing requirements are incompatible between the PAS Program and the General Investigations Program, it is not appropriate to use the PAS Program to prepare reports to Congress.

4-7. Study and Project Deauthorization.

a. Study Deauthorization. Section 710 of the WRDA of 1986 requires an annual submission to Congress of a list of authorized but incomplete water resources studies which have not had funds appropriated during the preceding five full fiscal years. The list is a list of studies meeting the eligibility requirement. Congress has 90 days, after the submission, to appropriate funds for the studies on the list. Studies that are not funded during the 90-day period are no longer authorized. Appendix G contains information on annual report requirements.

b. Project Deauthorization. Section 1001 of the WRDA of 1986 as amended, provides for the deauthorization of water resources projects on which Federal funds for planning, design or construction have not been obligated for 7 fiscal years. Every two years, the Secretary of the Army is required to submit to Congress a list of projects that meet this eligibility criteria. Affected congressional delegations must be notified of the projects in their districts or states. The projects remain on the list for 30 months, after which they are automatically deauthorized if Federal funds are not obligated during the 30-month period. Section 1001(c) requires publication of the lists of deauthorized projects in the Federal Register. The project deauthorization process is managed at HQUSACE by CECW-B and that office should be contacted for further information.

FOR THE COMMANDER:



RUSSELL L. FUHRMAN
Major General, USA
Chief of Staff

8 Appendices
(See Table of Contents)

ER 1105-2-100
22 Apr 2000

ER 1105-2-100
22 Apr 2000