

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

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.

l. 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.