Review Procedures for Water Resources Project Planning

Panel on Peer Review, Committee to Assess the U.S. Army Corps of Engineers Methods of Analysis and Peer Review for Water Resources Project Planning, National Research Council

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Review Procedures for Water Resources Project Planning

Panel on Peer Review

Committee to Assess the U.S. Army Corps of Engineers Methods of Analysis and Peer Review for Water Resources Project Planning

Water Science and Technology Board

Ocean Studies Board

Division on Earth and Life Studies

National Research Council

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COMMITTEE TO ASSESS THE U.S. ARMY CORPS OF ENGINEERS METHODS OF ANALYSIS AND PEER REVIEW FOR WATER RESOURCES PROJECT PLANNING: PANEL ON PEER REVIEW*

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* The Panel on Peer Review was one of four panels, operating under the auspices of a coordinating committee, that was convened by the National Academies' Water Science and Technology Board (lead) and Ocean Studies Board to carry out studies mandated in the Water Resources Development Act of 2000. The panel's charge is described in Chapter 1. The "parent bodies" are listed in Appendix E.

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Foreword

In the early 1800s the U.S. Congress first asked the U.S. Army Corps of Engineers (which was created in 1775) to improve navigation on our waterways. From that beginning, the Corps began a program of public works that has reshaped virtually all of the nation's river basins and coastal areas. Today we share in the benefits of those works: a reliable water transportation network, harbors that help link our economy to global markets, previously flood-prone land that is productive for urban and agricultural uses, hydroelectric power, and widely-used recreational facilities.

Now, at the beginning of the twenty-first century, the Corps program is under intense scrutiny. Traditional constituencies press the Corps to complete projects that have been planned for many years and campaign for new projects to serve traditional flood control and navigation purposes. At the same time, environmental and taxpayer groups express concerns about these projects in Congress and in the courts. Some of these groups have exposed technical errors in analyses that have been used to justify projects. For these critics, the Corps' water project development program must be reformed and the budget reduced or redirected.

Some of these same groups are pressing the administration, the Congress, and the agency itself toward a new Corps mission, broadly described as environmental restoration. However, the concept of restoration awaits more precise definition, and the science of ecosystem restoration is in its infancy. But it is clear that restoration is a call for water resources management that accommodates and benefits from, as opposed to controls, annual and multi-year variability in the patterns and timing of river flows and the extremes of flood and drought.

Meanwhile, the Corps is affected by a general trend in all federal agencies of smaller budgets and staffs. As demands for reform mount,

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the Corps' current staffing and organization may need to be reconfigured to provide improved and more credible planning reports.

As a result of this national debate over the Corps' programs and the quality of its planning studies, the U.S. Congress in Section 216 of the 2000 Water Resources Development Act, requested The National Academies to conduct a study of the procedures for reviewing the Corps' planning studies. In addition, the Congress requested a review of the Corps' "methods of analysis" used in its water resources planning.

In response to this request, the Water Science and Technology Board of The National Academies' National Research Council, in collaboration with the NRC's Ocean Studies Board, appointed four study panels—(1) Peer Review, (2) Planning Methods, (3) River Basin and Coastal Systems Planning, and (4) Resource Stewardship and Adaptive Management—and a coordinating committee to follow these panels' progress and to write a synthesis report.

Our study panels and coordinating committee held several meetings over the course of the study period beginning in 2001. We spoke with dozens of Corps of Engineers personnel, visited several Corps projects, and heard from different groups with interests in Corps projects. We came away with an appreciation for the dedication of Corps personnel and the complications and challenges they face in trying to being responsive to local project sponsors and the nation's taxpayers.

This is not the first study of the Corps by the Academies. However, these past studies were often focused on specific projects or on particular planning aspects. The reports in this series address the agency's programs in a wider context. Because we appreciate the importance of the U.S. Congress and the sitting administration in directing Corps' programs, many of our recommendations are directed to them.

The Corps has a long history of serving the nation and is one of our oldest and most-recognized federal agencies. But it is today at an important crossroads. The nation, through the administration and the Congress, must help the agency chart its way for the next century.

Leonard Shabman
Chair, Coordinating Committee

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Preface

The U.S. Army Corps of Engineers, through its civil works program, can take pride in its contributions throughout our nation's history to the development of waterways infrastructure, navigation, flood damage reduction, water resources development and protection, and environmental restoration. Many projects that have been pioneering in their concept and bold in their execution were made possible by the creativity and dedication of outstanding scientists, engineers, and builders.

The Corps has always had review processes for evaluation of its planning studies and projects, with the focus often being largely on the technical aspects. In recent years, however, increased consideration of such factors as environmental impacts, economic evaluations, political pressures, and new paradigms about flood control and management has engendered increased criticism and concern that some of the Corps' studies may have led to conclusions, recommendations, and project decisions that are not adequately supported by the assumptions and analyses that were used.

Our panel was charged to review "peer review procedures" and to assess both "an independent review process" and "existing technical review procedures." As these terms imply different views regarding "independent peer review," our panel chose to not use the term "peer review," instead simply referring to both independent and internal procedures as "reviews." The focus of our panel's report is on review of Corps of Engineers studies, with careful attention given to the need for independent, external reviews by panels of well-qualified and impartial experts for large, complex, and sensitive projects.

Our panel's principal conclusions relate to the increasing need for independence of the reviewers and the review process from the organization undertaking and responsible for a planning study or project (in this case, the Corps of Engineers) as project complexity, cost, and controversy increase. A

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fully independent review can only be accomplished by reviewers who are free of conflict of interest and who are appointed by a group external to the Corps. Our recommendations call for the establishment of an Administrative Group for Project Review (AGPR) to administer the review process—to be housed either in the Office of the Assistant Secretary of the Army for Civil Works or in the Office of the Chief of Engineers—and for a Review Advisory Board (RAB) to provide oversight of the AGPR activities.

To provide background and to set the stage for our work, we were briefed at our first meeting by Lt. Gen. Robert B. Flowers, Chief of Engineers; Dr. James Johnson, Chief of Planning; and Mr. Richard Worthington of Corps Headquarters in Washington. We extend our thanks also to Dr. Ronald Kostoff of the Office of Naval Research in Arlington, Virginia, who provided a briefing on review concepts and approaches at the panel's first meeting. We also owe thanks to Dr. Jack Fritz of the National Academies and Mr. Tim Searchinger of Environmental Defense, both of whom discussed review procedures with the panel at its second meeting.

The panel members provided diverse expertise and a wealth of experience in the many disciplines and topics relevant to this study—peer review, water resources engineering and planning, environmental and water law, river navigation and transport, ports, and Corps of Engineers history and operations. Each member brought a creative and fresh perspective to the study, and participated in the crafting of the several conclusions and recommendations and in the drafting of the report. We were also fortunate to have Dr. Leonard Shabman, Chair of the Coordinating Committee, participate in two of our panel's three meetings. Len's knowledge of the Corps of Engineers and its civil works program made his input especially valuable.

The panel was supported and guided in its work by the outstanding staff of the Water Science and Technology Board. WSTB director Stephen Parker got us on our way by setting the stage for the study. Dr. Jeffrey Jacobs, the study director, carried the bulk of the burden. His knowledge of the Corps and of river management issues, his ability to understand and synthesize information, his creative and effective writing, his initiative and responsiveness, and his enthusiasm made him a pleasure to work with. This study and report could never been completed without his tireless effort. We also acknowledge with appreciation the logistical support of Mr. Jon Sanders and Ms. Ellen de Guzman, and editorial guidance from Ms. Rhonda Bitterli.

The report was reviewed in draft form by individuals chosen for their diverse perspectives and technical expertise in accordance with the procedures approved by the NRC's Report Review Committee. The purpose of this independent review is to provide candid and critical comments that will assist the institution in making its published report as sound as possible and to ensure that the report meets institutional standards for objectivity, evidence, and responsiveness to the study charge. The review comments and draft manuscript

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remain confidential to protect the integrity of the deliberative process. We wish to thank the following individuals for their review of this report: Mr. Richard Conway (retired), Union Carbide, Charleston, West Virginia; Mr. Robert Crangle, Rose and Crangle, Ltd., Lincoln, Kansas; Mr. Steve Dola, Office of the Assistant Secretary of the Army (retired), Arlington, Virginia; Dr. William Graf, University of South Carolina, Columbia; Dr. Ronald Kostoff, Office of Naval Research, Arlington, Virginia; Mr. Thomas Maddock, Boyle Engineering, Newport Beach, California; Ms. Deborah Moore, independent consultant, Berkeley, California; Dr. Herb Ward, Rice University, Houston, Texas; Mr. Garrett Westerhoff, Malcolm Pirnie, White Plains, New York.

Although the reviewers listed above have provided many constructive comments and suggestions, they were not asked to endorse the conclusions or recommendations, nor did they see the final draft of the report before its release. The review of this report was overseen by Dr. Richard Goody, Harvard University (emeritus). Appointed by the National Research Council, he was responsible for making certain that an independent examination of the report was carefully carried out in accordance with the institutional procedures and that all review comments were carefully considered. Responsibility for the final content of this report rests entirely with the authoring committee and the institution.

We appreciate the opportunity to address an issue of importance to the future success of the Corps of Engineers mission in meeting the nation's needs for navigation, flood damage reduction, river and wetlands environmental protection and restoration, and water resources development.

JAMES K. MITCHELL
Chair

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Executive Summary

The nation's water resources infrastructure features thousands of dams, an extensive levee system, and many harbors that can accommodate large ocean-going vessels. The U.S. Army Corps of Engineers planned, designed, and constructed much of this infrastructure, and now maintains it. Corps of Engineers feasibility studies for such projects are today generally more comprehensive and more complex than in the past, and they are often conducted in a politically charged environment. These studies may be subjected to the careful scrutiny of many interest groups, with some of these groups retaining highly qualified analysts to review the Corps' fundamental assumptions and analytical methods. The complexity of some Corps planning studies and the challenges to some of these studies—especially the Corps' Upper Mississippi River-Illinois Waterway draft feasibility study in the late 1990s—by different interest groups led Congress to request the National Academies to provide advice on implementing improved review procedures for Corps water resources planning studies.

Corps of Engineers water resources projects have long been subjected to some degree of review. The Corps' former Board of Engineers for Rivers and Harbors, which was composed of senior Corps officials, reviewed Corps planning studies from the Board's inception in 1902 to its termination in 1992. Whatever merits the Board brought to the review process, the Board was not independent of the Corps. There is a strong and direct correlation between the independence of reviewers—in terms of both knowledge and association with a project and organizational affiliation—and the credibility, both real and perceived, of review.

Whatever type of review process is implemented within the Corps, the role of review panels should be to identify, evaluate, explain, and comment on key assumptions that underlie technical, economic, and en

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vironmental analysis. Review panels should highlight areas of disagreement and controversies to be resolved by the Administration and Congress. A review panel should be given the freedom to comment on those topics it deems relevant to decision makers, leaving it to the recipient of the review to decide whether those issues constitute "technical" issues or "policy" issues. Review panels should also be able to evaluate whether interpretations of analysis and conclusions based on analysis are reasonable. But review panels should not be tasked to provide a final "thumbs up/thumbs down" judgment on whether a particular alternative from a planning study should be implemented, as the Corps of Engineers is ultimately responsible for this final decision.

EXECUTING REVIEW WITHIN THE CORPS

The Corps' more complex water resources project planning studies (this report adopts a broad definition of "planning studies" that includes "reoperations" and retrofit-type studies for existing projects, as well as feasibility studies for new water resources projects) should be subjected to external, independent review. One or more panels of impartial, highly qualified experts should conduct this external review. External review panels should not include Corps of Engineers staff members and should not be selected by the Corps. External reviews should be overseen by an organization independent of the Corps, which will provide the highest degree of credibility of review. Examples of organizations that might lead these independent reviews include professional science societies and engineering societies and the National Academy of Public Administration. Responsibility for independent review could also be delegated to an independent federal oversight group (the Department of Energy's Defense Nuclear Facility Safety Board is one model).

Not all Corps of Engineers water resources project planning studies will require external, independent review, but the Corps should institute external review for studies that are expensive, that will affect a large area, that are highly controversial, or that involve high levels of risk. As a rule, the more independent this external review process is from the Corps, the greater the credibility—both real and perceived—the review will have. Internal reviews should be conducted for Corps planning studies that are less complex and less costly and that involve lower levels of risk. Internal reviews should be conducted by a panel that usually includes a balance in the number of Corps of Engineers staff and external experts. The Corps should select the panelists for internal reviews.

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An Administrative Group for Project Review

Corps of Engineers water resources project planning studies span a spectrum from small, low-impact projects to large, complex planning studies that consider a range of potentially large economic and environmental impacts. This diversity of planning studies calls for a review process that employs various levels of independence of review, depending on the project. Effective execution of this responsibility requires the establishment of a small, full-time, permanent body of professional staff. Congress should thus direct the Secretary of the Army to establish a small group—which we term the Administrative Group for Project Review (AGPR)—to administer the Corps' review processes. The Administrative Group for Project Review itself should not conduct reviews; rather, it should decide which Corps planning studies will require a review, and whether a review will be conducted externally or internally or with the current review process.

There are two practical options for the institutional home of the Administrative Group for Project Review: (1) the Office of the Assistant Secretary of the Army for Civil Works (ASA(CW)) and (2) the Office of the Chief of Engineers of the Corps. A review of the relations between these two offices and their respective histories shows that the balance of responsibilities for review between the Assistant Secretary of the Army for Civil Works' office and the Chief of Engineers has occasionally shifted since the ASA(CW) office was created in 1970. The nature of how Corps water resources project planning studies have been reviewed has also evolved. This panel noted that there are advantages and disadvantages of placing the AGPR in either body, and concluded that neither location is clearly preferential to the other.

The decision regarding the type of review (external, internal, or current procedures) to be performed should be made by the AGPR. But this decision should be open to review upon petition by interested parties, and a mechanism for the appeal of the decision should be established. If the AGPR is located in the Office of the Chief of Engineers, parties should be permitted to file an appeal to the ASA(CW). If the AGPR is located in the Office of ASA(CW), appeals should be submitted to an executive-level body such as the Council on Environmental Quality or the Office of Management and Budget. The entire appeal process should extend no longer than 60 days. Furthermore, the Administration (perhaps the director of the Office of Management and Budget) or Congress (via congressional resolution or other legislative action, but not simply committee

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language) should be able to request a review of a particular Corps planning study.

The AGPR should assist reviewers and panels in understanding the assumptions and methods in the study at hand. To facilitate the tasks of review panels, the AGPR should compile a document for each review panel that clearly summarizes and explains the contents, assumptions, models, and methods contained within a Corps planning study. The AGPR and the Corps' District Engineer(s) and other Corps analysts should be available to a panel during its review to answer questions about the study's evolution and contents, and to help review panels understand the implications of the panel's recommendations. The AGPR also should facilitate communication between review panels and appropriate other federal agencies, interest groups, and the public.

The Administrative Group for Project Review should produce a document that clearly explains the Corps' review procedures. The Corps' review procedures will evolve and mature, and they should be revised as the scientific, economic, social, and organizational context of Corps planning changes. This set of written review procedures should be viewed as flexible and amenable to changes and the AGPR should periodically update and revise this document.

In the case of external review panels, the appropriate independent organization should publish and disseminate reports. The AGPR should organize, publish, and disseminate reports authored by internal review panels.

A Review Advisory Board

The Administrative Group for Project Review would benefit by periodic, independent review of its mandate, structure, and decision-making processes. Periodic review and advice from an independent, interdisciplinary group of experts—a Review Advisory Board (RAB)—should be part of the implementation of the Corps' review procedures. Congress should establish this Review Advisory Board to provide periodic independent advice to the Corps regarding review procedures for its water resources project planning studies.

The Review Advisory Board would not perform study reviews nor would it select reviewers. The Review Advisory Board should assess review processes to help ensure consistency, thoroughness, and timeliness of reviews, and it would suggest changes for improving the review process. In doing so, it would use background material provided by the Administrative Group for Project Review, make necessary site visits, and incorporate information from public comments. The Review Advisory

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Board should consider both past studies and prospective studies and projects. The Review Advisory Board should periodically review the proposed scope and task statements of selected proposed reviews. To ensure the clarity and comprehensiveness of the planning study summary documents produced by the Administrative Group for Project Review, the Review Advisory Board should periodically review samples of these summary documents. The Review Advisory Board should report periodically to the office that houses the Administrative Group for Project Review.

The proposal for a Review Advisory Board clearly has merit. However, a board constituted with a mission focused exclusively on review procedures might be too narrowly focused to attract the interest of a broad range of well-qualified water resources planning experts. To ensure that the Corps' review procedures are reviewed by well-qualified analysts, the functions of a Review Advisory Board may have to be part of the mandate of a body charged with more comprehensive review of the Corps' planning procedures.

Independence of Review and Reviewers

The highest degree of credibility of external reviews will be achieved if the responsibility for coordinating the external review process is granted to an organization independent of the Corps. Such an independent organization must be in charge of selecting reviewers, all of whom should be independent of the Corps and free of conflicts of interest. Examples of organizations that could oversee independent reviews include professional science and engineering societies and the National Academy of Public Administration. There are other options as well, such as the Office of the Chief of Engineers, the Office of the Assistant Secretary of the Army for Civil Works (ASA(CW)), and the Office of Management and Budget. These options, however, do not offer the degree of independence that will provide highly credible review of controversial planning studies.

An important issue related to independence relates to use of the term "peer review." During the course of this study, it became apparent that this term means different things to different people. Moreover, our panel was charged to evaluate and comment upon both an "independent review process" and the existing technical review process of Corps planning studies. To avoid possible confusion, the term "peer review" is not used in this report. Rather, the report focuses on review of Corps of Engineers

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planning studies, with careful attention given to the need for independent, external reviews for large, complex, and sensitive projects.

Conceptual and Process Issues

An important step in ensuring effective use of the results of review is to clarify at the review's outset the review panel's roles and how results from the panel's report are to be used. Recommendations of review panels cannot be binding. A review panel is to provide a credible assessment of the planning study, which should serve as an evaluation aid to the Chief of Engineers, who is ultimately responsible for the final decision. A review panel should also be able to evaluate whether interpretations of analysis and conclusions based on analysis are reasonable. A review panel should not, however, present a final judgment regarding whether a project alternative or a particular operations plan should be implemented.

Results of the review should be presented to the Chief of Engineers before a final decision on a planning study has been made. A review panel's report should be a public document. Results of reviews should appear in Corps water resources project planning studies that are submitted to Congress. An instance in which a Corps District Engineer, and not the Chief of Engineers, may be the primary client of a review is when review is initiated in the early stages of a planning study (discussed below). To help ensure effective use of a review's results, the review's primary client—usually the Corps' Chief of Engineers—should respond in writing to each key point contained in a review. The Chief should either agree with the point and explain how it will be incorporated in the planning study, or rebut the comment and explain why the Corps is choosing to reject it.

Timing, continuity, and costs of review are important considerations for the Corps. It is not always clear when reviews should be conducted, or whether they should be conducted periodically or continuously. Concerns over the added costs of review are important given that local water resources project sponsors are required to contribute some portion of project costs. Project cosponsors often question the value of review, especially in instances where the local sponsor has a clear idea of the type and scale of project desired.

Corps of Engineers planning studies are conducted in two phases, a reconnaissance phase and a more detailed feasibility phase (Figure ES-1). The reconnaissance phase, lasting no more than one year, is used to determine whether there is a federal interest in a given water resources

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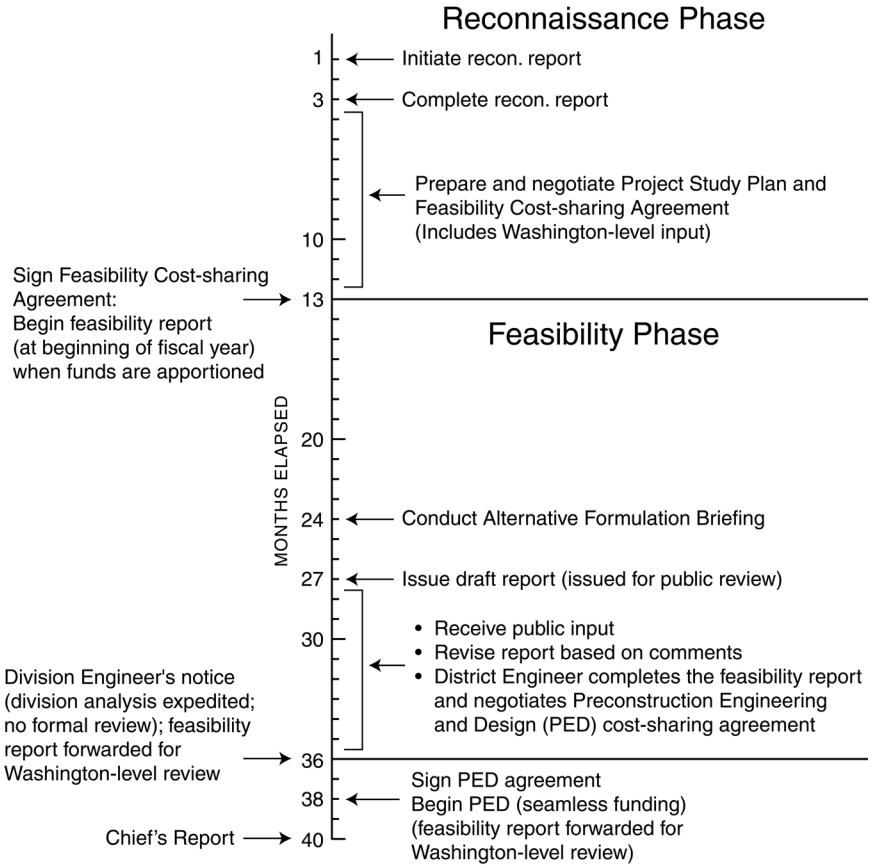

FIGURE ES-1 Corps planning study time line.

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problem or opportunity. In the event it is determined that a federal interest exists—and the majority of reconnaissance studies conclude that no federal interest exists—the Corps conducts a feasibility study.

In the idealized Corps of Engineers water resources project planning study, the feasibility phase lasts roughly two years. The point at which a review should be initiated will not always be clear, and it will vary depending upon a study's complexity and duration. It is important that review be initiated early enough in the Corps' study process so that the review's results can be applied to the feasibility study. Conducting review early within a planning study will also lend credibility to the process, as reviews conducted in a study's latter stages are more likely to be viewed as pro forma exercises.

With highly controversial studies, reviews should generally be initiated early in the feasibility phase, and there may be instances in which review could be initiated during the reconnaissance phase. Results of reviews initiated during a planning study's early stages should be submitted to the Corps' District Office. When reviews are initiated early in a planning study, the Corps' District Engineer should prepare a written response explaining how the Corps will incorporate the review's results into its planning study.

Reviews conducted at various stages of Corps planning studies also may have value. For example, in highly controversial studies, a review panel might conduct an initial review early in the feasibility phase, then meet later during the feasibility phase to conduct a more comprehensive review. Such multiple-stage reviews may be less practical for more focused and highly technical planning studies, but they should be used in more controversial and complex planning studies. These reviews may be especially useful for the Corps' most challenging planning studies, some of which may require over 10 years to complete. At the same time, it is important that panelists focus on their review of the planning study, and not become defenders of their recommendations. To guard against this—especially in lengthy planning studies—different review panels may need to be appointed at different stages of the study.

The cost of review is an important consideration, especially since the 1986 Water Resources Development Act (WRDA 1986) mandates stringent cost-sharing responsibilities for local sponsors. Since passage of WRDA 1986, local project sponsors have complained that the Corps study process takes too long and costs too much. There may be instances in which review could prove redundant and should be kept to a minimum. However, there are also instances in which Corps water resources project planning studies—especially controversial ones—could be more scientifically sound and could require less time and resources if they are given the benefit of review early in the process. There are examples of

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Corps feasibility studies that were not reviewed and that extended over several years, requiring considerable resources, but that were not completed in a timely manner because of uncertainties, controversies, and criticisms. Review should not be viewed as a burden, but rather as an essential part of Corps project planning that provides quality control. In fact, there will be instances in which review will help reduce planning costs and time. Effective review will ideally result in water resources planning processes that are transparent and accountable.

The current planning context features a huge backlog of Corps of Engineers projects; the construction of projects based upon recently completed planning studies will not begin for years. Extending a planning study by a few months for careful review thus seems to be of little consequence and is likely to represent time well spent. In terms of costs, especially in the case of large, expensive projects, adding careful review represents a small fraction of total costs and will generally represent a wise expenditure of resources.

To help implement this report's recommendations, Congress should provide the resources necessary to help the Secretary of the Army reformulate and strengthen the Corps' review procedures for its water resources project planning studies.

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Report Purpose and Scope

The U.S. Army Corps of Engineers developed much of the nation's waterway transportation, flood damage reduction, and coastal infrastructure, and it continues to play an important role in the operation and maintenance of these systems. As the nation's watersheds have become more heavily developed and as social preferences have changed, the Corps has become involved in ecosystem restoration projects and is faced with the challenge of adjusting operations of existing projects in highly controlled watershed and river systems.

Before submitting proposed water projects to Congress for approval, the Corps conducts feasibility studies that assess the economic, engineering, and environmental dimensions of potential projects. These studies are guided largely by a federal water resources project planning document, the Principles and Guidelines (WRC, 1983), along with several other Corps engineering regulations and engineering circulars. The Corps' water resources project planning studies and its water projects have never been free of controversy, and the Corps' planning techniques and decision-making procedures have been challenged for decades (Maass, 1951; Reisner, 1986). Several dimensions of Corps planning studies have come under scrutiny, raising the question of how the credibility of and the analyses within these studies might be strengthened by subjecting these studies to some degree of independent, external review.

An example of a Corps of Engineers planning study that has generated national-level interest and controversy is the Corps' feasibility study on the Upper Mississippi River-Illinois Waterway (UMR-IWW). In this study, which was begun in the late 1980s, the Corps is examining the economic feasibility of extending several locks on the lower portion of the Upper Mississippi River (Box 1-1). During this study (which continues at this

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BOX 1-1
The Upper Mississippi River-Illinois Waterway Draft Feasibility Study

In the late 1980s, the Corps of Engineers began a study of the economic feasibility of extending several locks on the lower portion of the Upper Mississippi River. Towboats had been encountering congestion in this portion of the navigation system and were thus experiencing costly delays.

The study posed several analytical challenges to the Corps. The Corps conducted the study in a systems framework that considered the entire Upper Mississippi River-Illinois Waterway system, making it one of the agency's more sophisticated planning studies. The Corps developed an economics model to forecast flows of waterway traffic through the system for different levels of grain supply and demand. The Corps also conducted and contracted for extensive environmental analyses to support the economics portion of the study. Moreover, the study was conducted in a highly charged political atmosphere, with passionately held viewpoints on many aspects of the Upper Mississippi River system. Farmers and towboat operators contend that the locks must be extended in order for them to be competitive in a global commodities market. Environmental groups contend that additional towboat traffic and the local environmental impacts of lock extensions will cause unacceptable damages to an already stressed ecosystem. Some taxpayer advocate groups question the price tag of approximately $1.1 billion for the extensions. The study, which by the year 2000 had reached over $50 million in cost, brought increased scrutiny to the Corps of Engineers and its planning and review procedures.

writing), controversies arose over key assumptions within the study and in regard to the study's analytical credibility. As a result, the Department of the Army requested that the National Academies[1] provide an independent review of the Corps' draft feasibility study, focusing on the study's economic analysis. The committee appointed by the Academies' National Research Council (NRC) recommended several ways in which the feasibility study might be improved (NRC, 2001).

In Section 216 of the Water Resources Development Act of 2000 (WRDA 2000), Congress directed the National Academy of Sciences ("The National

[1] The National Academies consists of the National Academy of Sciences, the National Academy of Engineering, and Institute of Medicine. The National Research Council is the operating arm of The National Academies.

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Academies") to "study the practicality and efficacy of the independent peer review[2] of feasibility reports" (Appendix A). It further directed that the Academy study "the cost, time requirements, and other considerations relating to the implementation of independent peer review" and the "objective criteria that may be used to determine the most effective application of independent peer review to feasibility reports for each type of water resources project."

This report from the Panel on Peer Review is one of the reports from the panels convened in response to the request in Section 216 of WRDA 2000 (this report's Foreword and Preface list the other study panels). The panel began its review of the Corps' review procedures in Fall 2001 and completed its report in July 2002. The panel was requested to review the current procedures for the review of Corps' feasibility studies and related technical documents and to provide recommendations for improving those processes. The panel was also asked to review and comment on review procedures as they existed during the tenure of the former Board of Engineers for Rivers and Harbors (BERH). Box 1-2 lists the full charge to the panel.

This report of the Panel on Peer Review contains recommendations on how the Corps of Engineers could improve its review procedures, including independent, expert review. Rather than focusing on the content of review (e.g., the underlying assumptions of economic analysis or flood forecasting methods), this panel focused on the process of review. This report thus provides guidance to the Corps on identifying studies that should be subjected to review, on how reviewers should be selected, and on the timing and administration of the review process.

PEERS AND PEER REVIEW

Within the scientific and academic communities, the term "peer" is often used in the context of "peer review," a practice widely employed by scientific and scholarly journals and scientific research programs. In this context, review consists of "peers" reviewing draft manuscripts, proposals, and strategic plans. But as conflicts of interest may taint this process, independent reviewers are almost always selected for reviews within the scientific and academic communities. For example, scientific journal editors almost never send a draft manuscript to a colleague in the author's home institution, and reviewers of scientific research programs usually must be from a different institution. In these contexts, the term "peer review" connotes independence from the agency

[2] As this panel was charged to comment on both independent review and the current technical review procedures, the term "peer review" is not used in this report. See preface, p. vii, and Ch. 1, pp. 10-11.

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BOX 1-2
Charge to the Panel on Peer Review

The panel will review the Army Corps of Engineers' peer review procedures for the Corps' water resources project feasibility reports and related technical documents, and provide recommendations for improving those procedures.

The panel will review the history, criteria, and future options for an independent review process. The panel will review the Corps' existing technical review process conducted at the Corps' district offices, Corps Headquarters policy review of draft and final authorization reports, and reviews by the Assistant Secretary of the Army and the Office of Management and Budget. The panel will also consider reviews during the feasibility study process by stakeholders and other agencies. The panel will review the previous concurrent Washington-level review process, in which Corps Headquarters, the former Board of Engineers for Rivers and Harbors (BERH), and the Office of the Assistant Secretary of the Army for Civil Works concurrently reviewed projects. The panel will also review the singular BERH process that was conducted before the late 1980s.

In formulating its findings and recommendations, the panel will consider cost, time requirements, and other appropriate considerations in formulating future peer review options for the Corps. The panel will consider the timing of peer review in the Corps planning process and will provide advice on implementing recommendations from peer review into feasibility reports.

and from the individuals whose work is being reviewed. The term "independent peer view" is commonly used to define these types of scientific and academic reviews, and this panel was requested to assess the prospects for an "independent review process" within the Corps (see Box 1-2).

In addition to independent review, this panel was also asked to review the Corps' existing technical review process. The existing process, and any reviews that might include Corps of Engineers professional staff as reviewers, are not truly independent. As this panel was requested to comment on both independent review and the existing review process, the panel chose not to use the terms "peer" or "peer review," and instead simply refers to both procedures as "review." The panel distinguishes between review that is internal and review that is external. The report's focus is on review of Corps planning studies, with careful attention given to the need for independent, external reviews by panels of well-qualified and impartial experts for large, complex, expensive, and controversial projects. Internal reviews should be conducted by panelists

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appointed by the Corps, and some of these panelists may be Corps of Engineers professional staff.

In external reviews, panelists should be independent of the organization and personnel conducting the study. External (independent) reviews must be conducted by experts not employed by the Corps of Engineers, who are selected by a group outside of the Corps, and who are free of conflicts of interest. These external reviews are equivalent to academic and scientific "independent peer review."

THE NEED FOR AND VALUE OF REVIEW

Reviews of Corps of Engineers planning studies will improve not only the studies' technical dimensions and quality, but will also add credibility to the arguments offered and the conclusions drawn, which is important for highly visible and controversial projects. Reviews by themselves, however, cannot ensure high quality planning studies; realizing the benefits of review requires that results be used as inputs to decisions by an organization's policy makers (Chubin and Hackett, 1990).

The Corps often faces a great deal scrutiny of its water resources project planning studies for several reasons: a willingness by the public to question federal agencies and to seek participation in their decision making procedures; improvements in scientific understanding of environmental impacts of large water projects; the desire of some members of the public to reduce expenditures of federal tax dollars; and a proliferation of engineering and scientific analysts outside the Corps. The Corps also operates under a complex set of mandates that reflect diverse interests and often contradictory views of water resources management. Moreover, the Corps operates at the behest of a Congress with diverse views of appropriate roles for the Corps, with diverse views on the appropriate balance between environmental conservation and resource development, and with competing visions of the desirable future state of the nation's river and water resources systems.

Corps planning studies are often controversial when those studies are based on assumptions about forecasts of key economic or environmental parameters. Moreover, many Corps projects have a design life of a century or more. This presents the dilemma of the necessity for long-term forecasts, knowing that the accuracy of those forecasts diminishes as one moves further into the future.

Projections of factors such as flood damages avoided, net economic benefits generated, levels of waterway traffic demand, or future environmental values provided may be open to question. These projections are typically based not upon fundamental engineering principles and methods—areas in which many people agree that the Corps is competent—but rather upon water

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resources economic and environmental issues that transcend traditional engineering considerations. These issues include estimates of supply and demand values for goods and services in global markets, valuation of environmental outcomes, risk and uncertainty analyses, and models of nonlinear ecosystem dynamics. Assumptions regarding future benefits from Corps projects have been criticized by some as being overly optimistic. This panel did not investigate these matters, but Corps projects come under a high degree of scrutiny when they hinge upon some unknown future level of economic or ecosystem services or when they are likely to cause significant environmental impacts. These factors have been central in Corps studies on the Upper Mississippi River-Illinois Waterway system, the Florida Everglades, and the Missouri River reservoir system. The Corps has come under fire in these studies, with many critics calling for a greater degree of formal review by independent experts.

External reviews of Corps planning studies, no matter how useful, should not be expected to resolve fundamental disagreements and controversies. Reviews should focus on environmental, engineering, and economic assumptions, data, methods, and models. Indeed, independent review is a necessary component of comprehensive water resources planning, as it ideally creates a process that is transparent and accountable. But such reviews should not be expected to resolve tensions regarding proposed water projects or operations alternatives. Those differences must ultimately be resolved by the Administration and by Congress in the authorization and appropriations process. Reviewers should assist the Corps in making decisions, but they should not be asked to make decisions themselves. Indeed, reviewers engaged in the external review processes described in this report should be identified for their professional expertise and should not be "stakeholders" at all.

SELECTING REVIEWERS FOR CORPS PLANNING STUDIES

In contrast to review of a scientific research and development (R&D) program, the Corps must decide on the fitness of proposals for the construction of civil works projects. In addition to technical considerations, civil works today include input and participation from local sponsors and are subject to authorization and appropriation from Congress. Accordingly, the Corps' review procedures necessarily differ from the review procedures tailored specifically to R&D programs within other federal agencies, such as the U.S. Department of Energy (DOE) or the U.S. Environmental Protection Agency (EPA).

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This report makes a distinction between external (independent) and internal review. Corps planning studies span a range of project proposals from traditional water resources engineering projects (e.g., rehabilitation of an aging lock chamber) to sophisticated environmental restoration projects (e.g., the Florida Everglades). This panel concluded that many Corps planning studies do not necessarily require external, independent review, and that, in many instances, Corps of Engineers professional staff should participate in reviews of technically focused planning studies. As planning studies become more sophisticated and expand beyond traditional engineering analyses, however, independent expert opinion would increase the review's comprehensiveness and credibility.

Figure 1-1 depicts the different pools from which experts with varying degrees of independence might be drawn to participate in reviews of Corps of Engineers studies. Moving left to right, the groups represented in the three circles in Figure 1-1 are (1) Corps of Engineers professional staff, (2) experts on a given water resources topic (the Florida Everglades is used as an example), and (3) independent (i.e., not employed by the Corps) water resources experts, as well as other analysts with relevant expertise (e.g., a scholar or scientist who may not specialize in water resources issues, but whose expertise may be useful in providing a balanced and comprehensive review).

Moving left to right in Figure 1-1, the circles and their intersections portray five classes of analysts in terms of internal and external reviewers: Class 1, Corps of Engineers staff without expertise on a given topic (the Florida Everglades in this example); Class 2, Corps of Engineers' staff with expertise in the Everglades; Class 3, Everglades experts not employed by the Corps, but who have conflicts of interest (e.g., an expert employed by the state of Florida, by an environmental advocacy group, or by the Florida sugar industry); Class 4, independent (non-Corps) analysts with Everglades experience; and Class 5, independent analysts without Everglades experience.

Internal reviews could be conducted by Corps personnel or with a balance of Corps staff and external experts. External and independent reviews would be conducted only with Class 4 and Class 5 experts as described above (it is worth noting that there may be few available "Class 4" experts and they may be difficult to identify and appoint). Furthermore, and just as important, those Class 4 and Class 5 experts should be appointed by a group outside of the Corps in order to constitute fully independent review. A third review option for the Corps would be to appoint experts from across this spectrum of reviewers, although the Corps would usually be best served by avoiding reviewers with conflicts of interest (Class 3 reviewers in Figure 1-1).

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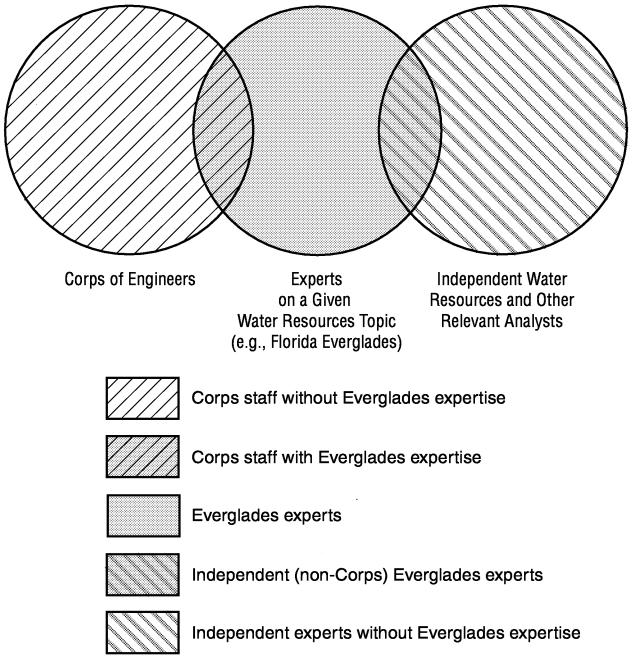

FIGURE 1-1 Potential experts for Corps of Engineers project review, using the Florida Everglades restoration effort as an example.

Before examining ways in which the current process might be improved, it is important to first understand the history of the review of planning studies within the Corps of Engineers, a history that explains much about the current status and approaches to review applied by the Corps. This history, described in Chapter 2, reveals that the Corps has utilized several mechanisms to ensure that the study proposed to Congress represents the Corps' best technical advice and complies with its statutory and regulatory mandates. However, there are countervailing pressures on the Corps, including the desire of congressional members and local sponsors for favorable reviews, and a belief by some that review is costly and does not add value to projects. Furthermore, external review has not been a significant part of the Corps' history.

The Corps' water resources project planning procedures, reviewed in a 1999 National Research Council committee report (NRC, 1999), are summarized in Chapter 3. Chapter 4 reviews elements that are critical to the success of review. In Chapter 5, review alternatives available to the Corps are discussed, and the implications of each alternative are examined.

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Chapter 6 summarizes recommendations that the Corps' complex planning studies be subjected to external review and that a new Administrative Group for Project Review be created to coordinate review procedures. Chapter 6 also summarizes recommendations for the creation of a Review Advisory Board which would provide periodic independent advice regarding review procedures for the Corps' planning studies. Chapter 7 summarizes the panel's findings and recommendations.

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2

History of Review of Corps of Engineers Water Resources Project Planning Studies

The Corps of Engineers has long prided itself on its engineering excellence. The Corps has constructed and maintains most of the nation's water transportation and coastal infrastructure. Engineers from around the world view the Corps as a model of engineering competence and admire the Corps' ability to fashion engineering solutions in challenging environmental conditions, including armed conflict.

Corps of Engineers planning studies, or "feasibility studies," have long been subjected to some level of review. For reasons discussed in Chapter 1, the Corps is currently under pressure to reform the review processes of its planning studies. This panel's mandate was to provide recommendations for improving review procedures of the Corps' feasibility studies. In this context, it is instructive to consider the history of review within the Corps. Knowledge of the setting in which review procedures were established, and how and why they have changed over time, can provide lessons about more and less useful approaches and may thus serve as a useful guide for future decisions.

The Corps' own staff members have generally conducted reviews of Corps planning studies. A mainstay of review within the Corps was the former Board of Engineers for Rivers and Harbors. Corps water project planning studies have also been reviewed by various groups within the Corps, such as Corps Headquarters (HQ) in Washington and Corps Division-level offices across the nation (the Corps has historically been divided into several Divisions and further divided into Districts; there are today 8 Corps Divisions and 41 Corps Districts). Corps water resources project planning studies today are reviewed by the Office of the Assistant Secretary of the Army for Civil Works (ASA(CW)) and by the U.S. Office of Management and Budget (OMB).

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BOARD OF ENGINEERS FOR RIVERS AND HARBORS

The U.S. Congress created the Board of Engineers for Rivers and Harbors (BERH) in Section 3 of the Rivers and Harbors Act of June 13, 1902. From then until 1992, the Board reviewed most of the Corps' planning studies for civil works projects. The Board's creation marked the culmination of the efforts of Theodore E. Burton (R-OH), former chairman of the U.S. House of Representatives Committee on Rivers and Harbors. For years, Congressman Burton had observed inconsistent treatment of proposed river and harbor projects by Corps officers reporting from across the country. The House committee's report on the River and Harbor Bill for 1902 (USACE, 1980) stated:

> The object sought by the creating of this board is to secure greater uniformity in the recommendations and reports relating to various projects in the country, and the examination of existing projects the further prosecution of which is considered questionable.

Congressman Burton, in defending the bill before Congress on March 17, 1902, stated:

> Section 3 provides for a board of engineers, five in number, who shall review all projects examined by the local engineers. This subject was considered at considerable length during the discussions upon the bill last winter. The recommendations upon which items are included in this bill come now directly from those having the rank of lieutenant colonel, or higher rank, to the Chief of Engineers. Those having a lower rank than that of lieutenant colonel transmit them to the division engineer, who then transmits them to the Chief of Engineers, with his approval or disapproval, then the Secretary of War transmits them to Congress.

Constituting the Board

The initial duties of the Board of Engineers for Rivers and Harbors, and the Board's relationship to the Chief of Engineers, were spelled out in section 3 of the 1902 Rivers and Harbors Act (see Appendix B). The act called for the Board to have five members. The 1912 Rivers and Harbors Act called for the Board's membership to be increased to no more than nine members. It was subsequently reduced to seven members by the Rivers and Harbors Act of 1913, the "majority of whom shall be of rank not less than lieutenant colonel." Its size remained at seven until Congress terminated the Board in 1992. Throughout its history, all Board members were staff of the Corps of Engi-

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neers (USACE, 1980, provides a more detailed historical examination of the Board).

Executing Its Mission

In carrying out its mission, the Board of Engineers for Rivers and Harbors reviewed all study reports of the Corps' proposed water resources projects, including major modifications to existing projects. These study reports were typically submitted to the Board by a Corps "Division Engineer," who was the chief engineer of a Corps Division. The types of reports reviewed by the Board included studies pursuant to resolutions of the Public Works Committees of both the Senate and the House of Representatives; all special reports ordered by Congress when, in the discretion of the Chief of Engineers, such a review was directed or warranted; and plans for the modification and reconstruction of any lock, canal, canalized river, or other work for the use or benefit of navigation (USACE, 1980). Between 1902 and 1992, the Board of Engineers for Rivers and Harbors reviewed reports on some 9,000 projects, with more than half receiving unfavorable recommendations from the Board.

The Board frequently made significant changes to reports submitted for its review. For example, in a survey of the Board's actions from 1966 through 1970, of a total of 339 reports the Board reviewed and acted upon, the Board reported favorably on 169 of them, unfavorably on 141 of them, and returned 29 for restudy (USACE, 1980). Of the 169 favorable actions, the Board made significant changes in the recommendations of 35 reports. The Board's authority was limited, however; the Chief of Engineers had the right to enter a contrary opinion, and the Board's findings could be nullified by the Secretary of the Army, by the Secretary of Defense, or by the president.

The Review Process Prior to 1988

Prior to 1988, the review process was sequential, with each review echelon conducting an analysis separate from other review bodies. Feasibility reports conducted by Corps District Offices were reviewed by the Corps Division Office, by the Board of Engineers for Rivers and Harbors, by the Chief of Engineers at Corps Headquarters, by the Office of the ASA(CW), and by the Office of Management and Budget. Each of these bodies reviewed different components (e.g., engineering, economics, hydrology) of a feasibility study, and these reviews generally were increasingly independent as one moved up the Corps organizational chart and away from the Corps District Office that produced the study. This process resulted in multiple checks throughout a

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feasibility study. This review process was lengthy, but also arguably provided high-quality review.

The Division Engineer's staff, through in-progress reviews and review of the draft feasibility report, conducted initial project review. Following completion of feasibility reports at the District level, reports were submitted to Division Engineers for final review. The Division Engineers then prepared their reports and issued public notices informing interested parties that reports had been forwarded to the Board of Engineers for Rivers and Harbors for review. Board staff reviewed those reports, and its reviews were presented to the group that submitted recommendations to the Chief of Engineers.

In accordance with the 1944 Flood Control Act, the heads of other federal agencies and the governors of affected states were given an opportunity to comment on proposed Corps of Engineers projects before authorization. These entities were to submit written views and recommendations to the Chief of Engineers within 90 days after receiving the report. Following passage of the National Environmental Policy Act (NEPA) in 1969, final Environmental Impact Statements (EIS), after being reviewed by the Board of Engineers for Rivers and Harbors, were sent to the heads of other federal agencies and governors of affected states for comment.

At the same time, final EIS reports were filed with the U.S. Environmental Protection Agency (EPA) and transmitted to other interested parties (those not included in the 90-day review) with a comment period of at least 30 days. The Chief of Engineers then considered the Board's recommendations, comments received during the 90-day state and agency review, comments received on final Environmental Impact Statements, and recommendations of the Director of Civil Works (referred to since 1999 as the Deputy Commanding General for Civil Works) in preparing final reports for the Secretary of the Army.

Office of the Assistant Secretary of the Army for Civil Works (ASA(CW))

Review at the Secretary of the Army level is conducted by the staff of the Assistant Secretary of the Army for Civil Works (ASA(CW)) after they receive the Chief of Engineers' reports. The position of Assistant Secretary of the Army for Civil Works was established in Section 211(a) of the Flood Control Act of 1970, Public Law 91-611. This Assistant Secretary's principal duty is to supervise the Department of the Army's programs for conservation and development of national water resources, including flood damage reduction, shore protection, and related purposes. The position of the ASA(CW) and its purpose were reaffirmed in Section 501 of the Goldwater-Nichols Department of Defense Reorganization Act of 1986, Public Law 99-433. The specific du-

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ties of ASA(CW) are enumerated in General Orders Number 1, which includes:

a. Managing the Department of the Army Civil Works program for conservation and development of the national water resources, including flood control, navigation, shore protection, and related purposes, including–

(1) Developing, defending, and executing the Army Civil Works legislative and financial program and budget.

(2) Administration of the Department of the Army regulatory programs to protect, restore, and maintain the waters of the United States in the interest of the environment, navigation, and national defense.

(3) Serving as Congressional liaison on Civil Works matters and as the Department of the Army point of contact for House and Senate Authorization and Appropriations Committees charged with oversight of the Department of the Army Civil Works program.

(4) Ensuring U.S. Army Corps of Engineers Civil Works program support for other federal agencies.

b. Formulating the program and overseeing the budget of the Arlington National Cemetery and the Soldier's and Airmen's home National Cemetery.

c. In coordination with the Deputy Chief of Staff for Operations (DCSOPS), directing the foreign activities of the U.S. Army Corps of Engineers, except those foreign activities that are exclusively in support of United States military forces overseas.

The position was first filled in March 1975 and has been filled by eight other assistant secretaries since then. As is the case with many political positions requiring Senate confirmation, there is frequently a gap in filling the position, particularly between administrations.

Executive Order 12322, dated September 17, 1981, requires that before a Corps feasibility report is submitted to the Congress, it shall be reviewed by the Office of Management and Budget for consistency with the policy and program of the president, with planning guidelines, and with other laws, regulations, and requirements relevant to the planning process. The Assistant Secretary of the Army coordinates this review before formulating the Secretary's recommendation to Congress.

WATER RESOURCES DEVELOPMENT ACTS

The 1974 and 1976 Water Resources Development Acts

By the early 1970s considerable opposition to many proposed Corps projects had materialized. In the Water Resources Development Acts (WRDA) of

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1974 and 1976, Congress chose to not authorize 60 proposed water projects, most of which had been reviewed by the Board of Engineers for Rivers and Harbors and had received favorable reports from the Chief of Engineers. However, Congress did authorize the Corps to proceed with a "Phase I design memorandum" stage of advanced engineering and design for these projects. The House Committee on Public Works and Transportation defined the Phase I design memorandum stage of advanced engineering and design to include post-authorization studies necessary to establish the project's basic design and scope, and to appraise a project's justification and public acceptability (U.S. Congress, 1976). These post-authorization studies were to:

- reaffirm the basic planning decisions made in the general investigations stage or reformulate the project to respond to changes since authorization,
- establish the scope of the project, based on current criteria, and develop from a multi-objective standpoint the optimum plan from the alternative plans studied,
- coordinate the project plan with views of other governmental agencies and local interests,
- provide the basis for a reliable, up-to-date estimate of project cost,
- provide a basis for updating environmental impacts and the environmental impact statement,
- establish the current economic aspects of the project,
- provide a basis for cost-sharing agreements, preparation of plans and specifications, acquisition of lands, and negotiation of relocation agreements,
- establish operating requirements and determine whether the project would meet such requirements,
- facilitate orderly scheduling and programming of funds for detailed design and construction of the project,
- provide an analysis of the consequences of possible alternatives, considering engineering feasibility, environmental effects, economic factors including regional and national development, social well-being, and other considerations as applicable,
- describe and consider the costs and means of eliminating, minimizing, or ameliorating possible adverse economic, social, and environmental effects that might result from the project, and
- provide the basis for a "Statement of Findings" signed by the District Engineer, fully describing the evaluation and decision process and stating that the proposed action was based upon consideration of a reasonable set of appropriate alternative courses of action for achieving the stated objectives; that the action was fully consistent with national policy, statutes, and administra-

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tive directives; and that the total public interest was best served by its implementation.

Essentially, the Phase I design memorandum concept was deemed appropriate by Congress given the substantial new environmental legislation enacted during this period, the changes in preferences by nonfederal interests and other stakeholders, the use of higher discount rates in updating project economics, and the changes in planning guidance (the federal *Principles and Standards*, the precursor to the current *Principles and Guidelines*, was issued in 1973).

Several Phase I authorizations were for projects with feasibility studies undertaken prior to the 1969 passage of the National Environmental Policy Act (NEPA). Corps of Engineers planning studies must comply with NEPA. A significant provision within the NEPA that affected changes to the Corps' planning procedures during this period (and subsequently) was the provision that requires the preparation of Environmental Impact Statements for proposed Corps water projects likely to have significant environmental impacts. The *Principles and Guidelines* also provide guidance on environmental considerations, with the principles stating that "the Federal objective of water and related land resources project planning studies 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" (WRC, 1983).

The 1986 Water Resources Development Act

By the time the Water Resources Development Act of 1986 (WRDA 1986) was passed in November 1986, many Corps water resources project planning studies had been underway for over a decade without reaching the point of project authorization. WRDA 86 authorized more than 200 federal water resources projects. Perhaps more significantly, although there had been cost-sharing provisions attached to Corps projects since the early twentieth century, WRDA 1986 required significant cost-sharing by nonfederal sponsors. The fact that they had to provide cash contributions for virtually all types of projects caused these nonfederal sponsors to become more intimately involved in project formulation and in the timeliness of authorization and implementation. Civil works projects thus could no longer be viewed solely as Corps projects, but rather as cooperative projects with nonfederal sponsors.

During this period, there were also changes in the works for Corps review procedures. In April 1988, Robert W. Page, then Assistant Secretary of the Army for Civil Works, tasked the Corps with developing a plan to limit reviews at the Washington level (Corps Headquarters, the ASA(CW)'s office,

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and the OMB) to six months. Mr. Page also asked for recommendations for consolidating the review staffs of the Board of Engineers for Rivers and Harbors and the Chief of Engineers. He stated: "While I recognize and support the need for the Board to advise the Chief, I believe the staff functions can be fully consolidated and one staff can support both levels of review (USACE, 1988)." The concept advocated by Mr. Page was to combine the review staffs of the Board of Engineers for Rivers and Harbors and Corps Headquarters into a single Washington-level review group to accomplish review for the Board of Engineers for Rivers and Harbors, the Chief of Engineers, and the ASA(CW).

CHANGES TO THE REVIEW PROCESS

In response to the cost-sharing requirements of WRDA 1986 and the concept of nonfederal sponsors as project planning partners, changes in planning study review and development were pursued under a program labeled Initiative 88. Under Initiative 88, there were two significant modifications to the pre-1988 review process. These changes were designed to reduce duplication and to accelerate the review process.

The first change was to include Corps involvement during the reconnaissance and feasibility phases (these phases and the Corps' planning procedures are explained in greater detail in Chapter 3). Procedures for early agency involvement were designed to assure that the proposed project is acceptable to all levels within the agency early in the planning process. The goal is a commitment to the nonfederal sponsor to process the feasibility report expeditiously for project authorization and to proceed with preconstruction engineering and design (PED). The primary mechanism for early involvement was the mandatory IRC—Issue Resolution Conferences—during the reconnaissance and feasibility phases.

The Issue Resolution Conference held during study reconnaissance included evaluation by Corps of Engineers Headquarters of the reconnaissance report conclusions against the general guidelines for reconnaissance studies. If the reconnaissance report met the intent of the guidelines, it would be certified by Corps Headquarters in order to initiate the feasibility study. This certification process provided for early termination of projects that lacked federal interest or were not in accordance with current policies or budgetary priorities. The second mandatory Issue Resolution Conference was held prior to the release of the draft feasibility report for public review. It generally was attended by representatives from the Office of the Assistant Secretary of the Army for Civil Works, Corps Headquarters, the Board of Engineers for Rivers and Harbors, the relevant Corps Division and District Offices, and the nonfederal sponsor. This Issue Resolution Conference included an evaluation of the feasibility study against planning and policy guidelines and against the specific

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guidelines resulting from the reconnaissance phase. The IRC and subsequent coordination of the IRC Memorandum for Record addressed the major study issues and minimized the potential for significant modification of the study conclusions and recommendations after the report was submitted for Washington-level review.

The second change was to initiate concurrent Washington-level review of feasibility reports by the Board of Engineers for Rivers and Harbors staff, Corps Headquarters, and the Office of the Assistant Secretary of the Army for Civil Works. In essence, once the Division Engineer transmitted a report to Washington, it was available for each of these organizations to review. Prior to the 1988 changes, Washington-level review was conducted sequentially by the staffs of the Board, the Chief of Engineers, and the Office of the ASA(CW).

In addition to authorizing several new water resources projects, WRDA 1986 enacted major reform of cost-sharing of water resources projects, as contained in Title I of that act. A result of the new cost-sharing provisions was that project cosponsors demanded a greater role in project-related decisions. These project cosponsors have generally not supported reviews of feasibility reports when those reviews have been seen as contributing to delays in the planning process.

The Initiative 88 changes provided for a single Washington-level review staff and a single Washington-level review. The 90-day state and agency review and filing of the final Environmental Impact Statement (EIS) with the Environmental Protection Agency was to be accomplished during the concurrent review period. The staff of the Board of Engineers for Rivers and Harbors coordinated the feasibility report review at the Washington level and provided information to assist decision makers at the Board, Corps Headquarters, and the Office of the Assistant Secretary of the Army for Civil Works.

Concurrent Washington-level review concluded with a briefing for designated senior representatives of Washington-level decision makers. Following the briefing, each Washington echelon acted on the report independently and sequentially. The sequence of the decision making was the Board, Corps Headquarters, and the ASA(CW), with each office acting within 30 days after the preceding office had forwarded its recommendation. An additional 30 days were allowed for the ASA(CW) to coordinate with the Office of Management and Budget. The Office of Management and Budget continued to function independently of the concurrent review process, with staff of the Office of Management and Budget reviewing feasibility reports, although this review was constrained by staff size.

Before feasibility reports on proposed projects were sent to the Congress for construction authorization (frequently a year or more after the signing of a report by the Chief of Engineers), OMB reviewed them for consistency with the policies and programs of the president and for compliance with federal

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guidelines for water resources projects. The OMB's views on a proposed project were reported in the Assistant Secretary of the Army's transmittal to Congress. Executive Order 12322 gave OMB a key review role on behalf of the Administration. It provided OMB with broad authority and with criteria for its water resources branch, under the Deputy Associate Director for Natural Resources, to review all proposed projects to be sent to Congress for authorization or appropriations. The review determined whether the proposed project was a supportable candidate for inclusion in the federal Water Resources Development Program on the basis of technical, economic, environmental, and administrative policies. The executive order required OMB to review these factors before a proposal could be sent to Congress.

Key Review Changes in 1992

With nonfederal interests continuing to stress the need for more expeditious and less comprehensive review of feasibility studies, the Corps undertook further evaluation of its review process. A Corps "Process Action Team" evaluated the review process and in 1992 produced a report (USACE, 1992) that recommended the following:

- *Eliminate Division-level review of decision documents*. The team concluded that the Division-level review added little value to project development. In cases where both Division- and Washington-level reviews were conducted, duplicate reviews occurred. Washington-level staff and decision makers did not always support Division action on reports for which approval authority has been delegated. Some reports approved by the Division were subsequently reviewed at the Washington level. Further revision was sometimes required before concurrence by Washington-level decision makers.
- *Create a Washington-level Central Review Center (CRC) to manage review of all Civil Works decision documents*.
- *Eliminate the Board of Engineers for Rivers and Harbors*. The team expressed a preference for eliminating the Board of Engineers for Rivers and Harbors. It was felt that the Board added costs and duplication to the review process.

Recognizing that dissolution of the Board would require an act of Congress, the group believed that measures should be taken at once to minimize the duplications within planning study reviews. Such measures were to include the transfer of Board staff to the Central Review Center and modification of Board meeting procedures to eliminate Division-level presentations.

The review process that stemmed from the 1992 report established a single level of policy review at the Headquarters of the Corps of Engineers and a

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single level of technical review within Corps District-level offices. The Washington-level review group was moved to Corps Headquarters and was reduced in size. In Section 223 of WRDA 1992 (Public Law 102-580), Congress abolished the Board of Engineers for Rivers and Harbors.

CURRENT REVIEW PROCEDURES

All feasibility reports and significant decision documents are currently reviewed by a Central Review Center, located within the Office of the Chief of Engineers in Washington, D.C. Since major organizational restructuring in 1996, Corps Division Engineers no longer review feasibility reports, with those reports going from the Corps' District-level offices directly to Washington for review. As a result, the Corps planning study time line (see Chapter 3 and Figure 3-1) has been shortened.

The current review process is supposed to feature technical review conducted by the Corps District Office and policy review conducted at Corps Headquarters. Ideally, the technical review will concentrate on the "how" of the project, including engineering and design criteria, accuracy of calculations, proper application of models, accuracy of cost estimates, and other such technical matters. Determining what constitutes "technical" review or "policy" review is a complicated matter, and the distinction between the two is not always clear. The review is conducted by a group not involved in the project development and can be a group within the District, a group from another District or the Division Office, or an independent contractor. Results of this review are documented and included in the report package sent to Washington.

A review team at Corps Headquarters conducts reviews of each project. That team includes Corps analysts in the agency's planning and policy, programs, counsel, and real estate branches. The review team begins its tasks early in the project development process. The tasks include participation in initial scoping when the feasibility study is initiated, review when alternatives are formulated and before the draft report is released for public comment, and review of the final feasibility report and final EIS or Environmental Impact Assessment. The review team coordinates with the staff of the ASA(CW) and conducts a briefing for OMB staff as part of Executive Order 12322 review in relation to the program of the president. The level of resources currently devoted to this review may be inadequate for the complexities and demands of these tasks.

Partially in response to these resource limitations, on August 23, 2001, the Principal Deputy Assistant Secretary of the Army for Civil Works informed the Chief of Engineers that the ASA(CW) office was expanding its staff to provide improved oversight of the planning and review processes (Appendix C). The plan calls for a new Deputy Assistant Secretary and three additional

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persons with expertise in key areas of water resources planning. The plan is for this group to "work closely with the Corps with the goal of improving our capability of providing well formulated, technically sound, well justified and environmentally acceptable solutions to water resources problems." Such an improved capability and consistent guidance in the development of water resources projects would facilitate a more effective and timely review and clearance process at OMB. Although this move holds promise for improving planning and perhaps review, it is too early to assess the impact and interaction of this augmented review capability in the Office of the ASA(CW) on the existing review process.

COMMENTARY

The contemporary water resources planning context in the United States has changed greatly over the past 50 years. Whereas water resources and related problems were at one time generally viewed by society as largely amenable through expert planning and engineering projects, they are today seen as more complex and not as easily resolved through strictly engineering means. There is today a call for more interdisciplinary approaches that include environmental and social scientists at all stages of planning and evaluation cycles, as well as for the input of citizens and other stakeholders. The engineering expertise that once served the Corps well does not, in itself, appear to be fully adequate for resolving many of the nation's contemporary water resources problems.

There was an era in the Corps' and the nation's history when review of Corps projects by the Board of Engineers for Rivers and Harbors was adequate. That era featured a strong social faith in technology and engineering to solve problems and in Corps of Engineers water resources project planning studies that were founded largely upon traditional engineering principles and methods. In a planning context where such problems are more complex, are in need of input from multiple disciplines and, in many cases, from stakeholders, and are often highly politicized, internal review of all Corps projects is not adequate.

WRDA 1986 initiated important changes that require multidisciplinary and independent review. The cost-sharing provisions of WRDA 1986 have made the Corps far more "customer driven." Local sponsors have pushed the Corps to shorten planning requirements and reduce costs. However, the need to consider multiple disciplines in water resources planning, and the need for careful review in the faceof this increasing complexity, suggest that the Corps' planning timeline can only be compressed so far. Moreover, the Corps' water resources project planning studies and projects are still largely paid by the federal taxpayers. The review process is an integral part of assuring the economic

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feasibility of a planning study. It may not be sound public policy to shorten the process to satisfy a local customer that is paying only a fraction of overall project costs.

Before discussing how such a review process might be structured and implemented, we examine the fundamentals of Corps of Engineers water resources project planning.

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3

Corps of Engineers Water Resources Project Planning Procedures

An understanding of the processes, time lines, and procedures used in water resources project planning by the Corps of Engineers is essential in developing a constructive and timely review process. This chapter presents an overview of the types of studies undertaken by the Corps, guidance provided to and by the Corps in its planning activities, and key steps in the planning process. It concludes with an examination of points in the planning process where review could be beneficial. This chapter draws from a previous National Research Council report (NRC, 1999) that reviewed the Corps' planning procedures.

TYPES OF STUDIES

The Corps of Engineers conducts a broad range of studies, including studies leading to new projects that require congressional authorization, studies involving evaluation and design of projects under continuing authorities, and reexaminations of existing projects. The range of studies is described in the Corps' "Planning Guidance Notebook," which contains specifics about Corps planning activities. It is published as Engineering Regulation (ER) 1105-2-100 (USACE, 2000).

ER 1105-2-100 defines three broad classes of Corps of Engineers water resources project planning studies and reports: (1) studies specifically authorized by Congress, the reports of which are submitted to Congress for initial authorization of projects, (2) studies of previously authorized, not-yet-constructed projects for which considerable time may have elapsed since authorization, including "general reevaluation studies" conducted to determine if significant changes in conditions affecting proposed projects have occurred since they were first authorized (reports

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of these studies are not generally submitted to Congress), and (3) studies covering a range of topics. The third class of studies includes different types of studies.

Reallocation studies examine the effects of adjusting the allocation of storage in previously constructed reservoirs (these reallocations can be very complex and controversial). *Post-authorization studies* examine recommendations for changes to projects that have been previously authorized but not yet constructed (similar to general reevaluation studies but limited to specific issues).

The *Continuing Authorities Program* grants the Secretary of the Army, acting through the Corps, to plan, design, and construct certain types of projects without project-specific authorization from Congress. Authority to conduct these activities is contained in various Congressional Rivers and Harbors and Flood Control Acts. The list of Continuing Authority programs has expanded in recent years, particularly for environmental programs.

This report focuses on review of planning studies for new projects that are formulated and evaluated under the reconnaissance-feasibility study process, and on studies of modifications to existing projects. Other studies listed above may be conducted in a manner similar to the reconnaissance-feasibility study process, and it may be desirable to include some of them within a review process.

Planning Studies for New Projects

Water resources project planning by the Corps of Engineers, including planning for cost-shared projects, is conducted in two phases, a reconnaissance study and a feasibility study (Figure 3-1). The Corps has long used this general approach, which was formalized with enactment of the federal Water Resources Development Act of 1986 (WRDA 86). Corps of Engineers water resources project planning studies are typically conducted by one of the Corps' 41 District-level Offices.

Reconnaissance Studies

A Corps of Engineers reconnaissance study is a broad assessment of a particular water resources problem in a particular location. Corps of Engineers reconnaissance studies are conducted to determine if there is a federal interest in addressing a given water resources problem or opportunity. These studies also assess the likelihood that solutions to a given water resources problem or opportunity would meet criteria for federal

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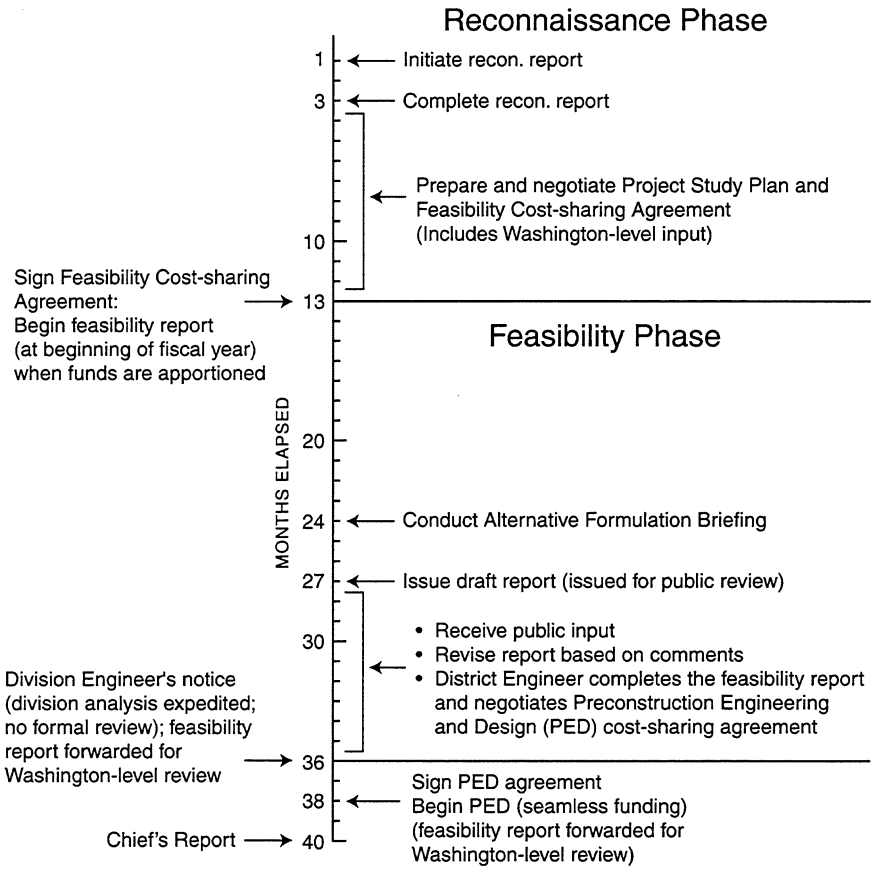

FIGURE 3-1 Corps planning study time line.

cost-sharing, and they identify nonfederal interests that are willing to pay their share of the cost, which includes 50 percent of the cost of the feasibility study. Reconnaissance studies are 100 percent federally funded, are not to exceed $100,000, and are generally completed in about one year's time (the NRC (1999) report estimates that reconnaissance studies between 1990 and 1996 averaged 13.5 months). Within these time and resource constraints, the level of detail in project design and evaluation clearly will be limited.

The reconnaissance study makes a recommendation as to whether a more detailed feasibility study should be conducted. Between 1986 and 1996, a total of 525 reconnaissance studies were completed; feasibility studies were initiated for 163 of these projects. That is, 31 percent of the

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reconnaissance studies resulted in initiation of a feasibility study (NRC, 1999).

For studies that move into the feasibility phase, the Corps and non-federal sponsor negotiate a project study plan (PSP) and a feasibility cost-sharing agreement (FCSA) to arrange for financing of the feasibility study. The project study plan includes specific engineering and scientific studies and management activities. Although details of the project study plan vary from study to study, the Corps and local sponsor must agree on task descriptions (what needs to be done and at what level of detail), financial responsibilities (who pays for each task), and task milestones (time periods over which tasks are to be completed).

Feasibility Studies

Feasibility studies are guided by two key documents. One is the 1983 *Principles and Guidelines for Water and Related Land Resources Implementation Studies*, or *P&G* (WRC, 1983). This document, adopted by the federal Water Resources Council in 1983, provides guidance for the Corps, as well as for the Bureau of Reclamation, the Natural Resources Conservation Service, and the Tennessee Valley Authority (key points of the *P&G* are summarized, and a link to the *P&G* is provided, on the internet at http://www.usace.army.mil/inet/functions/cw/cecwp/cecwp_temp/pg.htm; last accessed July 8, 2002). The other key Corps planning document is ER 1105-2-100 (USACE, 2000), which contains the *P&G* and provides advice on how the *P&G* is to be implemented. The *Digest of Water Resources Policies and Authorities,* guidance letters, and a series of engineering regulations (ERs) and engineering circulars (ECs) provide additional guidance.

The planning process described in the *P&G* document includes six steps:

1. specify problems and opportunities,
2. inventory and forecast conditions,
3. formulate alternative plans,
4. evaluate effects of alternative plans,
5. compare alternative plans, and
6. select recommended plan.

These steps are not intended to be strictly sequential, and it is understood that there may be iterative feedback within these steps as more information is gathered and analyzed during a planning study. The Corps usually begins Steps 3 and 4 within the first several months of the feasi-

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bility study, but the timing of these activities depends on the scale and complexity of the problem. At this stage, the Corps conducts project design analyses (including engineering and hydrologic studies) and estimates project benefits and costs. When a Corps District Office is prepared to present the alternative plans, an Alternative Formulation Briefing (AFB) is usually conducted.

The Alternative Formulation Briefing is held to facilitate early Washington-level acceptance of the plan formulation and selection process, the identified preferred plan, and the definition of federal and nonfederal responsibilities. The goal of the AFB is to allow a Corps District Office to release a draft report to the public concurrent with Washington-level policy compliance review of the report (see USACE, 2001). Regulations do not require an Alternative Formulation Briefing, but Corps District Offices are urged to hold this briefing, and that is the usual practice. At that time, the District Office is expected to address policy issues identified by the Division, District, or Corps Headquarters and others. Local sponsors and other interested parties, including technical experts, participate, and the public is invited.

After the Alternative Formulation Briefing, the Corps' District Office prepares the draft feasibility report and related environmental assessments or impact statements. Once completed, the draft feasibility report is made public, is widely distributed, and is subject to a mandatory 45-day public review and comment period. At the same time the draft report is made public, it is sent to Corps Headquarters in Washington, D.C., where it is reviewed by the Corps and other relevant federal agencies (e.g., the Environmental Protection Agency). The Corps responds to the review and to public comments in its revised feasibility report. When and if the project sponsor and the Corps agree on a final plan, the Corps' Division Engineer will sign a public notice recommending project approval.

The final step in the formal planning process is approval of the final feasibility study by the Chief of Engineers. This approval is in the form of a five- or six-page letter to the Secretary of the Army. Figure 3-1 illustrates the time line of the idealized Corps water resources project planning process.

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COMMENTARY: INSERTING REVIEW INTO THE PLANNING PROCESS

There are several points in the planning process where review might improve a Corps planning study. Review could be initiated at any of the points along the time line of the steps and activities described above and shown in Figure 3-1. However, intervention is likely to be more effective at some points than at others, and steps may have to be added to the process to make review more effective. Note, however, that initiating review at the outset of the reconnaissance study would hold little promise for improving the process, as there would be few details of the project analysis at that point, thereby providing little documentation for a review team to analyze.

The first milestone at which review might be useful in the planning process probably would be at the Alternative Formulation Briefing. An advantage of waiting until this briefing is that the process would have progressed to a point where substantial material would be available for review. Problems and opportunities would have been identified, forecasts of future conditions would have been made, alternatives would have been formulated, and estimates of benefits and costs would be available. A disadvantage of waiting until the Alternative Formulation Briefing is that substantial resources would already have been expended.

Critical first steps in the process are the identification of problems, the formulation of a broad range of alternatives, and the selection of analytical methods for forecasting future conditions and estimating effects of alternatives. Those steps were critical in the Upper Mississippi River–Illinois Waterway draft feasibility study (Box 1-1). If a synopsis of the scoping process and proposed analytical techniques had been available early in that study, review could have provided guidance that might have averted questions raised later.

Review after Step 5 in the six-step P&G planning process (described on p. 28)—after alternatives have been compared and before selection of the recommended plan—would appear essential if the Corps is to benefit from the review. Although that comes late in the process, the *P&G* document explains the iterative nature of the planning process. Feedback is inherent within the process, and if the Corps is to take advantage of feedback before the plan is finalized, review should be made an integral part of project planning.

However, an issue that arises in cases where a review is initiated while data-gathering, study, and analysis are still underway and conclusions have not yet been formulated is that the findings of the reviewers could become "directives" in that they might imply or call for modifications or additional studies and may suggest new conclusions and recom-

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mendations. One result is that the reviewers themselves then have assumed the role of advisors as well as reviewers, thus introducing bias and potential conflict in their ability to provide objective review later in the project. This dilemma raises the question of whether a completely independent review can come before the end of the planning process unless different review panels are appointed at each review stage.[1]

[1] It should be noted, however, that this panel supports the use of advisory boards composed of experts in the relevant subject areas, who may be both internal and external to the Corps, throughout the planning and implementation of major projects.

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4

Independent Review Principles and Considerations

The Corps of Engineers has a long history of subjecting parts of its planning studies to review. Implementing this report's recommendations for more comprehensive project review may challenge the Corps, however, as the processes for review of Corps planning studies have in the past been largely limited to internal reviews by Corps staff. This chapter identifies general principles regarding independent review that the Corps can draw upon to improve the credibility and effectiveness of its review processes.

Programs and methods for review exist in a variety of organizations, including academia, government, and the private sector. Organizational structures and processes for review differ greatly between organizations owing to differences in missions, outputs, and cultures. No single administrative structure or set of processes will be ideal for all organizations, and the Corps will surely adjust its procedures for internal and external review as it gains experience with independent review. Nonetheless, there are some general review principles and processes and several related considerations the Corps should weigh before it implements new review procedures.

COMPONENTS OF IDEAL INDEPENDENT REVIEW

Figure 4-1 depicts the components of an ideal *independent* review process. An agency might consider an array of inputs in structuring project review, including stakeholder opinion, agency goals and constraints, and federal objectives. Based on these inputs, the agency should define the general scope and goals of review. The agency then contracts with an

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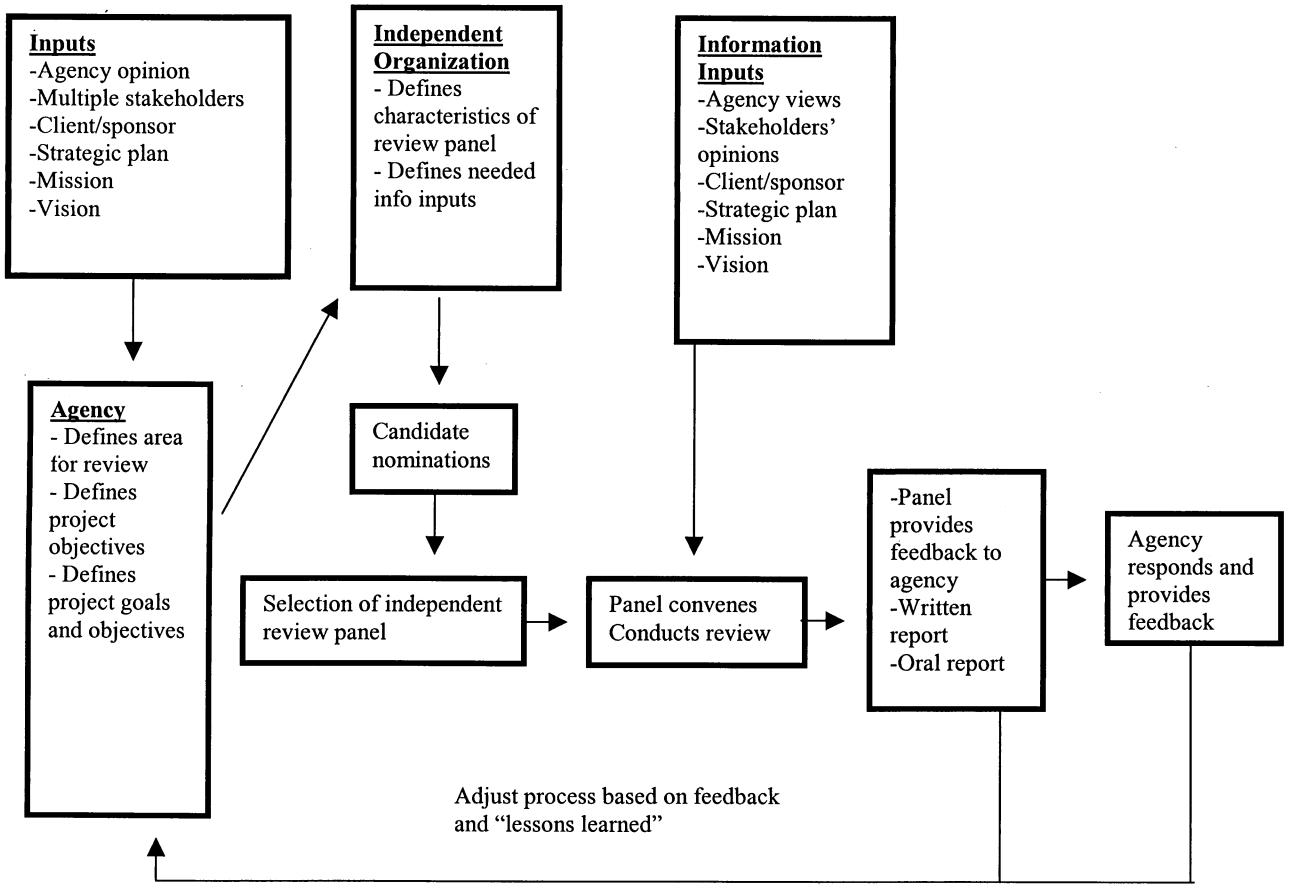

FIGURE 4-1 Idealized independent review process.

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independent organization, which selects and establishes an independent review panel (Chapter 5 discusses the features of independent organizations to oversee external reviews of Corps planning studies). The agency should provide to the panel information necessary for conducting the review. In addition to receiving viewpoints of the sponsoring agency, the review panel should receive input from relevant stakeholders. The panel's conclusions are provided in a final report. The agency then responds to the independent review panel's final report. The agency's response to the conclusions completes the review cycle. Other factors and questions should also be considered in establishing and revising review processes. For example, will reviews be conducted to determine if projects are consistent with an organization's strategic objectives? Are projects being executed in a manner that meets the organization's goals?[1]

ESTABLISHING A REVIEW PROCESS

Independence and Reviewers

Many individuals, organizations, and study committees have discussed how independent review might be defined. If a study or project is to be independently reviewed, the process for reviewer selection, and the reviewers themselves, must be as independent of the Corps as possible. That is, the process for selection of reviewers should be conducted by an organization outside the Corps, the reviewers should not be employees of the Corps, and reviewers should be free of conflicts of interest.

The twin issues of independence and credibility prompt several questions the Corps will want to consider: Can reviewers be affiliated (e.g., as a consultant or former employee[2]) with the organization for which the review is being conducted (the Corps)? Can federal agency officials beyond the Corps be allowed to serve as reviewers? Who will select reviewers? The organization itself, or an outside body?

The affiliations and experiences of the reviewers strongly affect re-

[1] We note that the charge to a review panel for a specific study or project must be carefully defined as to whether consistency with an agency's mission and goals is to be a part of the review ("right job"), or whether the review is to be confined to the methods used and the validity of the conclusions and recommendations derived therefrom ("job right").

[2] This may be an especially important consideration for the Corps of Engineers, as many highly qualified technical experts serve as consultants following retirement from both military and civilian positions in the Corps.

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view credibility. All potential reviewers carry professional and personal biases, and it is important that these biases be disclosed when reviewers are considered and selected. It should be determined which biases—if any—will disqualify prospective reviewers. An organization should also develop criteria for determining if review panels are properly balanced, both in terms of professional expertise as well as in points of view on the study or project at hand.

Structuring the Review Process

Review panels might carry out their duties in numerous ways. Reviews are often conducted in the traditional style of face-to-face panel discussion led by a panel chair. These meetings often extend over a one- to three-day period, and over the course of a study or project, several such meetings may be held. There are, however, other ways in which reviews might be conducted. Review panels might conduct their work sequentially, with pre-meeting assignments followed by discussions in subgroups, followed by reports and plenary discussion by the entire panel. A review panel could employ a professional facilitator, leaving the chair free to fully participate in the discussions. Panels might operate in the open or (consistent with applicable laws) behind closed doors, or both. Panels might meet once or dozens of times. Panels can be standing or ad hoc.

Review does not necessarily require panels to meet. There may be instances in which meetings are not feasible because of time, resource, or other constraints, and there are many alternatives to face-to-face meetings. For example, federal agencies commonly use "mail" or "ad hoc" reviews in which draft reports are mailed to expert reviewers. Mail reviews are much less expensive, as there are no travel costs, but they may be far less effective, as reviewers are not able to engage in face-to-face discussion. There may even be instances when a single expert, rather than a panel, is used to review an issue or report. Reviews can employ multiple review levels, in which a parent panel coordinates the review activities of smaller panels or task forces that are engaged in specific review activities. Different review panels could be employed at different stages of a study. Telephone calls have been used as a review mechanism, and videoconferencing is increasingly employed today. In revising its review procedures, the Corps should be aware of the range of review options, and it may wish to experiment with some of them as its review process matures and improves.

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Maturing of the Review Process

Initiating and developing effective review procedures in large organizations often requires a considerable amount of time, as well as flexibility within the organization, so that lessons from the successes and failures with the procedures can be used to improve review. Ideally, an organization will develop a written and transparent set of procedures over time and will modify this set of procedures as necessary on a continuing basis.

The maturity of the process can be measured by how formal and by how widely and clearly understood the process is within the organization and to the reviewers. For example, is the process oral or documented? Is it clearly understood by the organization being reviewed? Are roles and responsibilities clearly defined and understood so that each individual knows what is expected? How closely is the process followed in practice? Are the criteria that define a successful project documented and understood by the project owners and the reviewers? As an organization gains experience with review procedures, the procedures will generally become more widely understood and more standardized throughout the organization.

Organizational and Social Issues

A strong commitment from an organization's leadership is an important factor in ensuring effective reviews (Kostoff, 1997). An organization's top decision makers must decide upon their level of commitment to high-quality review. They must also consider the types of motivations and incentives they will provide to their staff and reviewers to conduct thorough—and critical—review.

Another consideration is the audience of the review. For example, reviews of Corps of Engineers planning studies will usually be addressed to the Chief of Engineers (or to a Corps District Engineer in cases where reviews are done early in the planning study), but other organizations and government agencies are also likely to have interests in a review's results. Other stakeholders that will often be interested in the outcomes of reviews of Corps planning studies include environmental groups, hydropower producers and distributors, navigation interests, and state natural resources agencies.

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SELECTING THE TYPE AND LEVEL OF REVIEW

Decisions regarding the type and level of review are important, as reviews regarded as inadequate by higher-level administrators, by internal or external critics, or by affected stakeholders may delay or block a project, while reviews that are too stringent waste resources. Criteria for selecting the appropriate level of review should balance the risks and consequences of inadequate review against the resources required for more complex and stringent levels of review. Larger, more complex projects, projects in which uncertainties are significant, and projects in which consequences of failure may be severe generally should receive the most stringent degree of review. To enhance credibility, these reviews should be independent of the organization that has developed plans for the project.

A qualitative assessment regarding the appropriate level of review required can be made by mapping the project onto a two-dimensional space where one axis represents "project risks" and the other represents "project magnitude" (Figure 4-2).

Project risks include uncertainties about project outcomes and the potential for societal controversy. Imperfect analytical procedures or inadequacies in data or knowledge may lead to uncertainties in forecasts of project costs and in environmental, social, and engineering outcomes. Corps planning studies are often controversial when they are based on projections of key economic or environmental parameters, such as future levels of waterway traffic or future environmental outcomes. There is also potential for controversy when there are conflicting agency missions or societal interests. Consequences of failure may include undesirable and potentially severe effects that cannot be mitigated or reversed, such as losses of life and property. Other considerations include possible cost overruns and funding and budget shortfalls.

Project magnitude includes both the project itself and considerations such as costs (monetary and nonmonetary), importance, and complexity. "Importance" includes monetary and nonmonetary benefits, project scale (local, regional, national, or international), and cumulative and long-term effects. "Complexity" includes multiple social, political, environmental, biological, hydrologic, and engineering aspects, as well as the degree of novelty and extent of prior experience.

Figure 4-2 illustrates that several issues must be considered in decisions regarding the appropriate level of review. The arrow shows that increasing "project magnitude" and "project risks" warrant an increasing degree of independence of review, with an increased depth and complexity of review and an increased scope and diversity of the expertise of the

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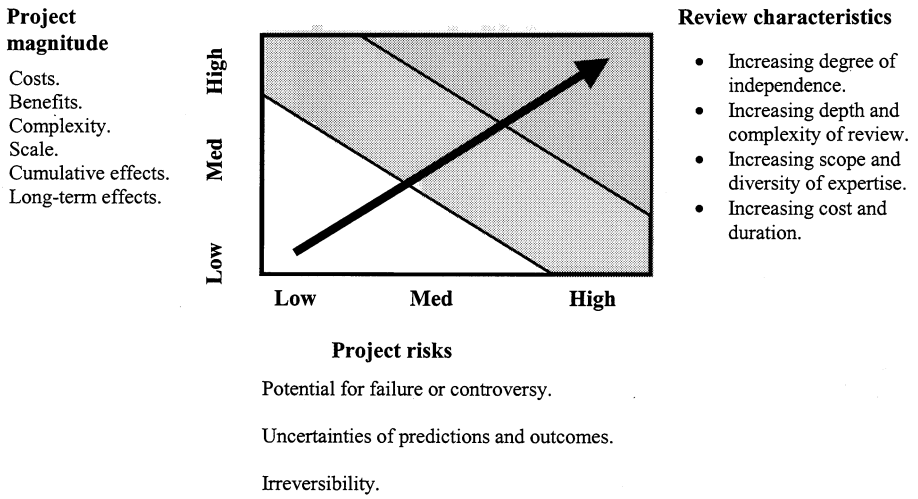

FIGURE 4-2 Risk and magnitude criteria in selecting the level of review independence.

reviewers. Reviews of such projects will cost the most and require the most time.

Figure 4-3 illustrates the process for selecting the level of review independence with two examples of current Corps of Engineers projects. The Comprehensive Everglades Restoration Project will affect a large portion of southern Florida and the adjacent marine ecosystem. Many of this restoration project's outcomes in this large, complex ecosystem defy prediction, and its key environmental outcomes are thus largely uncertain. Combined with a volatile political context with many well-informed and passionate stakeholders, and with the project's current estimated cost (roughly $8 billion), the project clearly ranks very high on the "magnitude" axis and relatively high on the "risk" axis (the project is being conducted under an adaptive management paradigm, which implies that even though environmental and related outcomes are uncertain, lessons will be learned through the restoration process, and management

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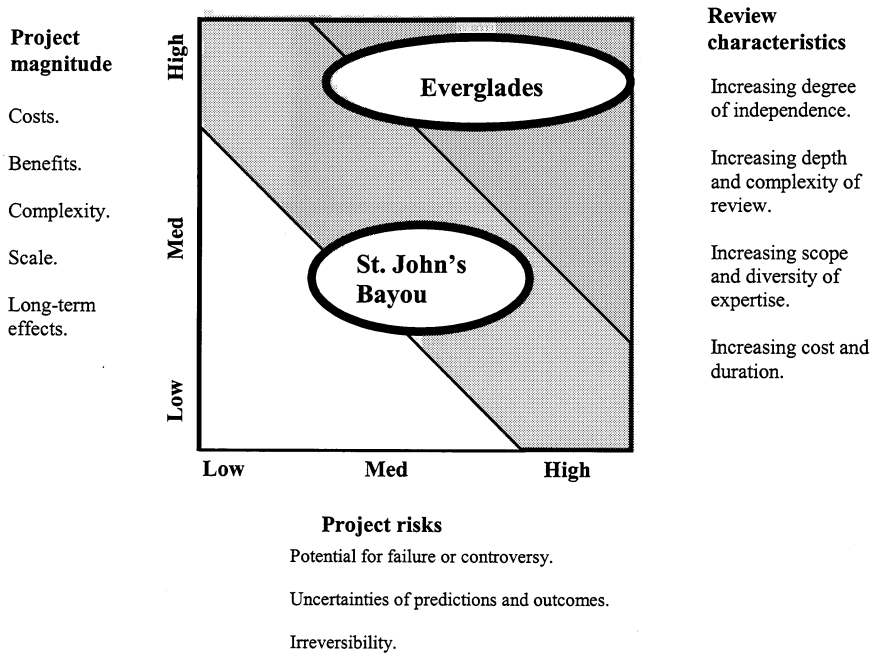

FIGURE 4-3 Hypothetical illustrations of magnitude and risk for two projects.

strategies will be continually adjusted, thereby reducing somewhat the prospects for irreversibility). The range of magnitude-risk of the Everglades project is represented as a broad oval that extends from the medium portion of the risk scale well into the high end. The largest portion of the oval falls within the space where external review is recommended.

In contrast to the Everglades restoration project, the St. John's Bayou and New Madrid Floodway Project on the Mississippi River floodplain in the state of Missouri is less costly, is on a smaller scale, and has design features (levee and drainage system) that are less complex. As there are significant uncertainties and complexities surrounding the project, it would rank in the middle, rather than at the bottom, of the risk scale.

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COMMENTARY

Several conceptual questions surround the creation of an effective review process. They include choosing appropriate projects for review, evaluating the appropriate level of independence of review, determining the audience, selecting the expertise, number, and independence of reviewers, and defining the scope of review. These questions are especially important in determining the specifics of reviews of Corps water resources planning and construction projects owing to the variety and intensity of stakeholder perspectives, the need to consider economic and environmental consequences along with scientific and technical issues, and the highly charged political environment that surrounds many projects. In the case of highly visible and controversial projects, the two most important considerations in selecting reviewers are the credentials of the reviewers (which includes affiliations as well as expertise) and the group that selects the reviewers. Public perception may well have greater influence than public understanding in determining the fate of a project. It is often the case, however, that a minority of stakeholders reflect that "public" perception. The review process thus needs to be structured such that good science, sound engineering, and public welfare are the most important factors that determine a project's fate.

Determining the appropriate level of reviews will constitute important decisions for the Corps. With projects that are more complex, costly, and controversial, a review's credibility will be based in large part on the independence of the reviewers and of the review process from the Corps and from the project being reviewed.

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5

Alternative Approaches to Review

Corps of Engineers water resources project planning studies could be reviewed and evaluated within many different organizational structures and by many different criteria, some of which are used by other government agencies. In considering how the Corps' review procedures might be improved, it is instructive to examine review procedures of other organizations, including other federal agencies (Appendix D lists a sample of review procedures employed in other federal agencies). Some review procedures in other federal agencies were formulated in response to specific legislative directives. Others were established pursuant to broader administrative and legislative mandates, such as the Government Performance and Results Act (GPRA) of 1995. Each of these review frameworks was adapted to the unique policy and organizational setting in which the referenced activities take place. It is important to note that there is no comprehensive structure for review that covers all federal programs, nor is there any single standard approach to review employed across federal agencies. One reason for this lack of a review standard is differences in agency structures, missions, and histories. For example, the nature of the Corps' activities and of its planning studies and projects usually varies greatly from that of most other federal agencies. In other agencies, clearly defined and specific mission-related research programs and projects often are the subjects of review. For example, the U.S. Department of Energy, the U.S. Environmental Protection Agency, and the U.S. National Science Foundation employ review processes for scientific research programs or funding proposals that are typically more specific

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and more focused than the Corps' civil works program for water development.

Beyond U.S. agencies, many international organizations have developed review procedures. The World Bank, for example, commonly enlists "independent panels of experts" to review its project appraisal documents and to monitor project implementation. The World Bank also established an inspection panel that processes claims filed by people affected by projects, and it also independently reviews the extent to which World Bank policies and guidelines have been followed. Another example is the organization Transparency International, which has established review procedures across a variety of sectors, including public procurement, financial accounting, and voting procedures (http://www.transparency.org; last accessed July 9, 2002).

The World Commission on Dams (1998-2000), an independent body that reviewed the worldwide impacts of dams, developed guidelines for best practices for independent review. The following excerpt from its report (WCD, 2000) illustrates the Commission's perspective on review and independent review panels (IRPs):

> IRPs further provide a quality control function to assure the developer, regulator, financing agency and affected groups that the necessary standards are being met and that laws or guidelines are complied with. . . . They usually perform functions in the social and environmental domain similar to independent engineering inspection for technical issues. . . . The IRP is independent of all parties and its terms of reference should allow the panel to look into any issues deemed important without the need to justify such examination.

Corps of Engineers planning studies have unique features that merit consideration in the establishment of appropriate review procedures. Corps flood damage reduction, navigation enhancement, and other civil works projects often involve major economic and environmental consequences, and they may also entail significant social and cultural considerations. The potential for widespread controversy over the conclusions and recommendations of Corps planning studies is thus high in comparison to the potential for controversy in agencies where the focus tends to be primarily on research and development programs. This is not to say that useful review paradigms in other organizations cannot be used to inform the Corps' review procedures, and the Corps should draw upon lessons from successful review programs in other organizations and federal agencies. Nonetheless, the Corps is a unique agency, and implementation of review procedures must be made with consideration of the Corps' unique roles and projects.

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This chapter discusses relevant criteria for evaluating alternative approaches to review. Several options for constructing a process for the Corps are then examined in light of these criteria. Findings from this examination form the basis for the recommendations presented in Chapter 6.

CRITERIA FOR EVALUATING ALTERNATIVES

Several different review processes could be formulated for review of Corps water resources project planning studies. Several different criteria must be considered in weighing these alternate approaches to review. The degree of independence from influence by the Corps of Engineers is a preeminent criterion, as it is strongly related to a review's credibility. The process by which reviewers are nominated and selected is also important, as it will affect a review's independence and credibility. The affiliation(s) of the group or individuals selecting the reviewers is a key issue, as are the affiliations and backgrounds of the reviewers themselves. Issues related to conflicts of interest and biases may arise in connection with review processes within federal agencies such as the Corps of Engineers, and care must be taken to minimize these concerns. There is also the challenge of selecting review panels that are viewed as credible and balanced, but that also have adequate knowledge of the Corps' often highly complex planning guidance and analytical methods.

Independence of review begins with the nomination and selection of reviewers. Credibility of this process does not necessarily require that the selection process be totally divorced from the Corps for all decisions. For example, the Corps should be allowed to nominate panelists for an independent review panel—but it should not select them. In fact, some degree of participation by the Corps in the review will generally help increase the review's usefulness, even in fully independent reviews. The Corps should help inform the review panel of a planning study's key assumptions and methods, and it should discuss with the panel ways in which the panel's findings might be most useful. The fact remains, however, that in large, controversial projects, a review's credibility will be a function of the distance between the reviewer selection process and the Corps. To reiterate, the two most important considerations in establishing a review panel's independence are (1) who selects the reviewers, and (2) who the reviewers are.

If the purpose is to improve the quality of Corps water resources project planning studies, the results of review will be more useful to the Corps before it prepares a final recommendation on a planning study. Comments from reviewers can be addressed before a final project rec-

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ommendation is made public. If a review is primarily intended to provide to Congress and the public a fully independent judgment about a project proposed by the Corps, the review could be deferred until after the Corps' recommendation.

In addition to informing Congress and the public, the review should also assist the Corps in the process of reaching its final recommendation. Results of review should thus be directed to the Corps—usually to the Chief of Engineers—before the Chief develops a final decision. This recommendation does not imply that results of a review should be provided confidentially to the Chief of Engineers. In fact, review panel reports should be made public and should be incorporated in the record of the project that is sent to the Office of Management and Budget (OMB) and Congress. The Chief of Engineers should also address each key finding or recommendation in the report, either by agreeing and stating what steps will be taken in response, or by disagreeing and rebutting the comments.

Reviews should not duplicate other review processes required by law or included within normal executive functions of the government. The Fish and Wildlife Coordination Act of 1934, the National Environmental Policy Act, and other statutes require external review of Corps projects by select parties. Comments from other agencies may identify the need for review to provide advice on particular issues, but the review should not duplicate studies of other agencies. In addition, OMB routinely reviews Corps planning studies for consistency with Administration goals and priorities before those studies are included in the budget proposed by the Administration.

The group that selects reviewers for Corps projects should be knowledgeable of the Corps' mission, its statutory authorities and related administrative regulations, and other planning and evaluation procedures. The Corps operates within authorities and directives given to it by Congress, and it has a set of guidelines and regulations that provide a decision-making framework. That framework leaves considerable discretion to Corps staff as they execute the various steps in the planning process. Review panels should thus include, or have available as a resource, experts familiar with the guidance and regulations under which the Corps operates. To ensure that review panels have this knowledge, the group that selects reviews either should be familiar with the community of external water resources experts who have knowledge of the Corps' decision-making and planning framework, or should be able to draw on individuals who can provide the needed expertise.

Reviewers may find themselves in disagreement with the results of Corps planning studies. These results may have been driven by specific

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regulations or guidelines, or they may have resulted from staff exercising discretion within the regulations and guidelines. Reviewers should aim to draw distinctions between criticisms of the regulations and guidelines and criticisms of how well the Corps conformed to planning guidance.

Finally, any arrangement for implementing a review process should consider the implications for staff and supporting resources. Some reviews may entail a greater number of reviewers than others, some reviews might be conducted by videoconferencing or by mail, and some meetings might employ a professional facilitator. Some arrangements might entail a large staff with the full complement of skills necessary to review projects in detail, while others may be more selective in the aspects of decisions that will be reviewed.

As it moves to implement a more thorough and credible review process to meet contemporary and future water resources management challenges, the Corps should consider a wide variety of criteria and options. In creating an institutional mechanism to help facilitate a revised review process, the Corps should ensure that the following functions, responsibilities, and capabilities are established for the review process: recruit and maintain quality review panels, gather information from stakeholders, prepare high-quality draft feasibility studies in a timely fashion, arrange for external and internal reviews, receive the Corps' responses to review recommendations, and follow up with inquiries regarding Corps actions based on review recommendations, where appropriate. Full coverage of these items will require a significant and sustained level of resources.

VARIATIONS ON INDEPENDENCE

The Corps has several institutional options for helping ensure independence of the processes for nominating and selecting reviewers. Examples of institutions that could conceivably assume some reviewer selection duties and that are completely external to the Corps include, but are not limited to, the National Academies, the National Academy of Public Administration, professional science and engineering societies, and independent federal oversight groups. Options more closely related to the Corps are the Office of Management and Budget (OMB), the Office of the Assistant Secretary of the Army for Civil Works (ASA(CW)), and the Office of the Chief of Engineers.

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Options External to Corps

National Academies and National Academy of Public Administration

The National Research Council (the National Academies' research arm) is frequently enlisted to conduct independent reviews on a range of controversial federal projects. The Upper Mississippi River–Illinois Waterway draft feasibility study and the Comprehensive Everglades Restoration Plan are two examples of studies for which NRC (through its Water Science and Technology Board) has reviewed water project plans.

Placing a permanent, independent review panel for the Corps within the National Academies and its National Research Council is not feasible, however, because such action would delegate a function of government to the National Academies, which would be inconsistent with the Academies' mission and mandate. However, various NRC boards convene "standing committees." These committees have rotating memberships and provide programmatic advice to a sponsoring agency. They operate under guidelines that apply to all NRC committees, convening meetings and providing advice through reports to agencies that fund their activities.

The National Academy of Public Administration (NAPA) is an independent organization dedicated to improving the performance of governance systems. It provides advice to public institutions, nonprofit organizations, and private companies that share in the implementation of public policy. The National Academy for Public Administration, an independent, nonprofit organization chartered by Congress, responds to specific requests from public agencies. This is a legitimate option in the independent review for the Corps, as the National Academy of Public Administration specializes in administrative and governance issues central to the execution of the Corps' planning guidance, and it has also reviewed policies and administrative arrangements for natural resources management. The NAPA also assembles standing panels on specific topics.

Technical Societies and Professional Associations

Other alternative groups for overseeing independent reviews of Corps planning studies include professional engineering and scientific societies and associations. These groups, which include bodies such as the American Association for the Advancement of Science and the

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American Society of Civil Engineers, meet a key criterion of being independent from the Corps of Engineers. Such professional groups, however, are unlikely to be able to effectively identify and assemble the breadth of expertise (e.g., engineering, economic, ecological, policy) required for comprehensive review of the Corps' most complex planning studies.

In addition to these bodies, another option would be to establish an independent federal oversight group, an example of which is the Department of Energy's Defense Nuclear Facility Safety Board, which provides advice on public health and safety issues at nuclear facilities (see http://www.dnfsb.gov; last accessed July 8, 2002).

Options Closer to the Corps

Several options for selecting reviewers and managing the review process are administratively more closely related to the Corps. These are the Office of Management and Budget (OMB), the Office of the Assistant Secretary of the Army for Civil Works (ASA(CW)), and the Office of the Chief of Engineers. Although these options are less independent than those described above, they better satisfy other criteria compared with other options within the executive branch of government. They likely represent a greater level of knowledge of Corps authorities and procedures and are likely to have greater continuity over time.

Office of Management and Budget

The OMB is currently part of the process for reviewing Corps projects, but the reviews usually do not take place until after projects have been finalized and reviewed by the Chief of Engineers. The OMB reviews a project for consistency with planning guidelines, for quality of the project as indicated by benefit-cost analysis and other criteria, and for its impact on the budget. External review could be organized and administered by OMB, but that review could duplicate its existing review, and it could inject OMB deeply into Corps planning. If OMB is involved in review prior to final review by the Chief of Engineers, it is not clear that it could serve as an impartial reviewer after the Chief of Engineers approves a planning study.

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Assistant Secretary of the Army for Civil Works

The Office of the Assistant Secretary of the Army for Civil Works (ASA(CW)) represents an alternative organization for coordinating review. An advantage of this option is that, while moving the process away from the Corps' direct management, reviews could be kept within the administrative agency that has authority over the Corps. Such an arrangement would make it possible to more easily incorporate review comments before a project is recommended to the OMB. A disadvantage of placing the review function in the Assistant Secretary's Office is that the Office of the ASA(CW) may be too closely related to the Corps to provide truly independent review of Corps planning studies.

Intra-Corps

Another review option could be an intra-Corps review process where reviewers would be Corps personnel and the process would be administered within the Corps. This process would be similar to that used by the former Board of Engineers for Rivers and Harbors, although the staff requirements would not be as great those of the former Board. The primary advantage is that the review process would be easily managed and easily integrated into the Corps' planning process. It would draw upon experts most knowledgeable of Corps projects and procedures (it could also consult with independent experts as it deemed appropriate).

There are at least two important shortcomings to such a structure: it would not be independent of the Corps, and it would fail to take advantage of expertise outside the Corps. Critics may argue that independence from the Corps is essential—and for controversial projects, independence is essential to establishing and maintaining credibility—but establishing an "intra-Corps" review process is an option for the Corps.

A variation on this option would be to have the Corps appoint a panel of reviewers from outside the Corps. The Corps would provide staff support, but the panel would operate independently of the Corps. This process would give the Corps the opportunity to identify experts from a variety of disciplines relevant to the mission of the Corps and its project purposes. It would be seen as being more independent of the Corps than the first option, but would still be affiliated with the Corps. Because the panel would be selected by and possibly paid by the Corps, it would not be a truly independent review body. For controversial projects that receive favorable comments by a review panel, project opponents would likely accuse the Corps of creating an improperly biased panel.

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CONCLUSION

No option under the authority of a single organization can satisfy equally all the criteria that might be considered important in creating an effective review process. Options that represent a high level of independence from the Corps may not provide sufficient knowledge of Corps planning and decision-making processes and procedures, they may not provide sufficient continuity to the process, or they may not be willing or able to commit sufficient resources to support review activities of the Corps. Options closer to the Corps may not be sufficiently independent of the Corps to provide needed levels of independence and hence credibility.

An option that would best satisfy the multiple evaluation criteria is one administered by a small professional staff with expertise in Corps planning processes and procedures, but using external reviewers when appropriate. Such a review staff should hence be established and should examine all planning studies and projects as they are initiated to determine the appropriate level (current procedures, internal, or external) of review, administer the process by which reviewers are nominated and selected, and provide staff support for external reviews and dissemination of findings.

We term this group the Administrative Group for Project Review. Its structure, duties, and operation are discussed more fully in Chapter 6.

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6

An Administrative Group for Project Review

An Administrative Group for Project Review (AGPR) should be established to organize and administer review of Corps of Engineers water resources planning studies and projects. The Administrative Group for Project Review would have three options for deciding if a Corps water resources planning study should be reviewed: (1) current review procedures, (2) internal review, and (3) external, independent review conducted by an organization independent of the Corps. In addition, a Review Advisory Board (RAB) should be established to provide continuing oversight and fresh perspectives for the Administrative Group for Project Review. This Board should be established and maintained by an organization independent of the Corps.

The Administrative Group for Project Review should consist of a relatively small, full-time, and permanent professional staff reporting directly either to the Assistant Secretary of the Army for Civil Works or to the Chief of Engineers. To ensure the highest quality of reviews, the director of the Administrative Group for Project Review should be a Senior Executive Service–level professional, and the professional staff should possess broad knowledge and expertise in disciplines relevant to water resources planning. The Administrative Group for Project Review would assess Corps reconnaissance reports in order to designate which future draft feasibility reports should be reviewed. The Administrative Group for Project Review would apply magnitude-risk criteria, such as described in Chapter 4, to select the appropriate type of review.

Another important AGPR responsibility would be to prepare a document summarizing the key assumptions, methods, and conclusions of a planning or reoperations study. This summary document would be

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crucial to expediting the duties of review panels, as the details of Corps of Engineers planning studies may be difficult for reviewers—especially external expert reviewers—to quickly and thoroughly comprehend.

The Administrative Group for Project Review would maintain all documents associated with a review, report periodically to the independent Review Advisory Board (discussed in more detail below), and act as the advocate for review. The AGPR should organize internal review panel meetings and activities and should assemble, publish, and disseminate reports from internal review panels. Reviewers should be selected on a project-specific basis, and the number of reviewers and the fields of expertise should be determined by the nature of the planning study. The Administrative Group for Project Review should develop and maintain a resource list of possible reviewers. External review reports should be published and disseminated by the organization conducting the study.

The Administrative Group for Project Review should prepare a set of clearly written procedures that define the Corps' review procedures. As the Corps gains experience with these procedures, the procedures will likely evolve. The written guidelines should be viewed as flexible and the AGPR should periodically revise these written procedures as necessary.

Some reviews are likely to be complex and may require substantial commitments of reviewers' time. In some circumstances, it may thus be appropriate for reviewers to be compensated. Suitable staff support for the review is also important. A large staff does not appear to be necessary, but the AGPR should include both a professional staff with a strong working knowledge of the Corps and its operations, including a director with Senior Executive Service status, and technically qualified senior staff. Congress should assure that the AGPR has the professional staff to execute all these duties.

INSTITUTIONAL HOME

The NRC Panel on Peer Review reached several conclusions that draw upon the options and criteria discussed in Chapter 5. There are options that give authority for review to professional engineering or science societies or to other groups beyond the Corps. In considering an institutional home for the Administrative Group for Project Review, however, these bodies are likely to be too administratively distant from the Corps and its planning studies to provide effective and sustained oversight of all review procedures. Those independent organizations are also unlikely to place adequate priority on the review process to allocate resources sufficient to sustain the activity. The Office of Management

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and Budget has its own unique role in the budgetary process, and therefore it is not an appropriate place to establish any type of Corps of Engineers administrative review group. This panel identified two viable options for the AGPR's institutional home: the Office of the Assistant Secretary of the Army for Civil Works (ASA(CW)) and the Office of the Chief of Engineers.

There is a long and rich history of the respective roles that each of these bodies has played in the review of Corps planning studies, as well as their relationship with one another. In discussing this history, our panel noted that these roles have shifted over time and that the balance of responsibilities for review between the two offices has also occasionally shifted. An example of such shifts is illustrated in a memorandum dated August 23, 2001, from Mr. Dominic Izzo, Principal Deputy Assistant Secretary of the Army for Civil Works. The memo describes the creation of a new group within the ASA(CW) Office to improve oversight of the project planning and review process (Appendix C). Future shifts in responsibilities for the review process are a distinct possibility, and these shifts will have implications for the appropriate institutional home for the Administrative Group for Project Review. These shifts also make discussions about an appropriate institutional home for the AGPR problematic.

The panel concluded that neither the Office of the Chief of Engineers nor the Office of the Assistant Secretary of the Army for Civil Works was clearly preferential to the other, and that the background of shifting responsibilities within these two offices complicated the decision regarding an appropriate institutional home for the AGPR. The panel also felt that the decision about an institutional home may ultimately represent more of a policy decision than an analytical one, and that a final choice about institutional home would be more appropriately made by another body, likely the U.S. Congress.

AGPR REVIEW OPTIONS

In deciding upon the appropriate type of review for a Corps planning study, the Administrative Group for Project Review would choose among three options (Figure 6-1):

1. *Current Review Procedures.* The current process would continue (which includes the District Office, Corps Headquarters, a review team in the Office of the Assistant Secretary of the Army for Civil Works, the

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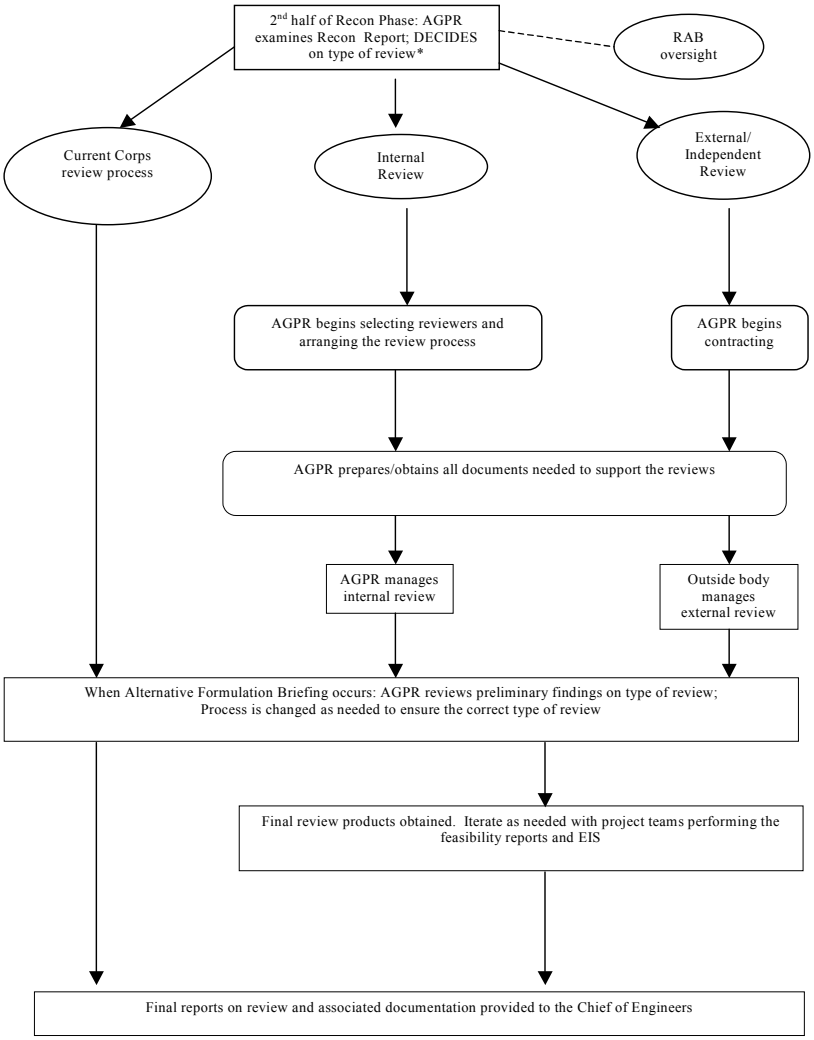

FIGURE 6-1 Review options.
*In some complex planning studies, it may be appropriate to initiate review during study reconnaissance.

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Office of Management and Budget, and, where applicable, other federal agencies such as the Environmental Protection Agency; see Chapters 2 and 3 for discussion of these various reviews within the current procedures). This option is likely to be applicable primarily to smaller, lower-cost, lower-risk, noncontroversial projects.

2. *Internal Review*. An internal review process would be managed by the Administrative Group for Project Review, which would select the reviewers. The scale could be either small or large, differing by the number of panelists and the time allotted for review. A key distinction between the current process and internal review is that in the internal review process, a special review panel is appointed, and the panel may include experts from outside the Corps and it may also include Corps staff from other districts. Internal review panels should usually consist of a balance in the number of Corps of Engineers professional staff and non-Corps experts.

3. *External, Independent Review.* The Administrative Group for Project Review would contract with an outside organization for the selection of review panelists. This type of review would be for large-scale, expensive, and/or controversial projects. External, independent review panels should consist of experts independent from the Corps, and the panel members should be selected by an organization independent of the Corps.

The AGPR's choice about the appropriate level of review should not be unilateral, however, and this decision should be open to review upon petition by interested parties. If the AGPR is located in the Office of the Chief of Engineers, appeals should be permitted through the Office of the Assistant Secretary of the Army for Civil Works. If the AGPR is located in the Office of the ASA(CW), appeals should be lodged with an executive-level body (e.g, the OMB or the Council on Environmental Quality). Moreover, the Administration—perhaps through a memo from the OMB director—should be able to request a review of a Corps planning study. Congress should also be able to request a review through a congressional resolution or other legislative action, and not simply through committee language accompanying a bill. The entire appeal process should extend no longer than 60 days.

Internal Review

Nominees for internal reviews may be selected from government, the private sector, or academia. Rules should be required to ensure an open

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nomination process. The names of the nominees and their nominators should be published prior to final appointment. The review panel should usually consist of a balance in the number of Corps professional staff and non-Corps experts. Final authority for the selection and appointment of reviewers would rest with the Administrative Group for Project Review.

External, Independent Review

As part of external, independent review, the Administrative Group for Project Review would contract with an outside organization to select an external and independent review panel. There are precedents for federal agencies having an external group manage their review processes. Examples include the NASA Life Sciences Branch (reviewed by the Universities Space Research Association), the U.S. Department of Army Medical Program (reviewed by the American Institute of Biological Sciences), and the U.S. Department of Energy's Office of Science and Technology (reviewed by the American Society of Mechanical Engineers). Independent review of Corps planning studies could also be delegated to an independent federal oversight group, such as the Department of Energy's Defense Nuclear Facilities Safety Board, which provides advice to ensure adequate protection of public health at nuclear facilities. Other options for organizations to oversee this independent review include the National Academies, the National Academy of Public Administration, and professional science and engineering societies.

The Administrative Group for Project Review should assist external reviewers in understanding the Corps' assumptions and methods in the relevant study. To assist a review panel, the AGPR should compile a summary document that clearly explains the contents, assumptions, models, and methods contained within a Corps planning study, project design, reoperations decision, or other relevant analyses. As noted earlier, preparation of this summary document will be a key responsibility of the AGPR.

During an independent panel's review, the Administrative Group for Project Review should be available to answer questions about a planning study's evolution and contents, as should staff from the relevant Corps District Office(s). The AGPR should maintain communication between the Corps and the review panel through the course of the review, without compromising the review's independence. Frequent communication will help the review panel understand the technical and practical implications of its recommendations. The AGPR should also promote cooperation and communication between the review panel and other parties with stakes and interests in the study at hand. The AGPR should typically

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provide administrative support for external review, although a consultant could be hired for this purpose.

ENSURING EFFECTIVE AND CREDIBLE REVIEW

Defining the Terms of Review

An issue that frequently arises in review, and one not always easily agreed upon, is defining a review panel's boundaries of inquiry. It is not uncommon for an agency or other administrative group to try to limit a review panel's deliberations. For example, review panels may be charged to limit their discussions to "science" issues, and to not comment upon "policy" issues. Within the Corps, this issue has often been reflected as a tension between issues defined as "technical" and those defined as "policy." However, the line between technical and policy issues is often blurred, and it is often difficult to clearly separate them.

Review should be conducted to identify, explain, and comment upon assumptions that underlie economic, engineering, and environmental analyses, as well as to evaluate the soundness of models and planning methods. Panels should also be able to evaluate whether the interpretations of analysis and conclusions based on analysis are reasonable. To provide effective review, in terms of both usefulness of results and of credibility, review panels should be given the flexibility to bring important issues to the attention of decision makers. However, review panels should be instructed to not make a recommendation on whether a particular alternative should be implemented, as the Chief of Engineers is ultimately responsible for the final decision on a planning or reoperations study.

Responding to Review

To ensure effective reviews, it is important that there be a clear understanding from the outset of the objectives of the review and how the review's results will be used (Kostoff, 2001). To help ensure that reviews do not become pro forma exercises, the primary client of reviews—the Chief of Engineers—should respond in writing to each key point in a review. The Chief should either agree with a point and explain how it will be incorporated into the planning or other study, or the Chief

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should reject the comment, providing an explanation of why the Corps is choosing to ignore it.

A Review Advisory Board

A Review Advisory Board (RAB), which should be a small, independent group that meets periodically to review the process and activities of the Administrative Group for Project Review, should be established. The Review Advisory Board would not perform study reviews. It would examine and advise upon the processes for selecting reviewers and establishing independent external review bodies. The Review Advisory Board would assess processes for ensuring consistency, thoroughness, and timeliness of reviews. It would consider both past studies and prospective studies and projects. As part of this responsibility, the Review Advisory Board also should periodically evaluate the scopes of review proposed by the Administrative Group for Project Review. This is important to help ensure that charges to review panels are clear and that the review scope includes appropriate technical and policy considerations. Finally, the Review Advisory Board should periodically review a sample of the summary documents produced by the Administrative Group for Project Review to ensure the clarity and comprehensiveness of those documents.

The Review Advisory Board could suggest changes to enhance the quality of the review process. It would periodically issue reports to the office that houses the Administrative Group for Project Review. The Review Advisory Board would use background materials provided by the Administrative Group for Project Review, make site visits as necessary, and incorporate information from public comments when available.

This panel discussed the prospects for the Review Advisory Board to enlist experienced and qualified water resources experts, and was concerned that a board mandated only to review review processes might be too narrowly structured to attract highly qualified scientists, engineers, and analysts. The RAB's responsibilities may thus need to be made part of a body charged with a larger advisory mandate to the Corps.

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Timing and Administrative Costs of Review

Timing

Review can be beneficial at several stages in the planning process. The panel has incorporated specific steps into the planning study time line of Figure 3-1 to accommodate the review process (Figure 6-2). A preliminary determination would be made within three months regarding the possible need for, and scale of, review. If review is needed, the Administrative Group for Project Review would begin the process of identifying and selecting reviewers. When the Alternative Formulation Briefing (in which a Corps District Office releases a feasibility study's alternatives for consideration) is later held, the Administrative Group for Project Review should reexamine its preliminary determination of the need for a review and the scope of the review.

When either an internal or an external review is conducted, the review process should be initiated early in the study. The reason for this early start is that it is useful for Corps District-level planners to have evaluations from reviewers on the assumptions, methods, and data to be used in the feasibility study. If a review is not undertaken until after the Alternative Formulation Briefing, it may be too late to provide useful assessments to Corps District planners.

The circumstances surrounding the Corps' Upper Mississippi River-Illinois Waterway draft feasibility study (Box 1-1) provide a good example of the value of initiating review at an early stage. If a synopsis of the scoping process and proposed analytical techniques had been submitted for review early in that study, review could have provided input that might have averted questions raised later. Reviews of planning studies should generally begin at about the time the reconnaissance report is certified and the feasibility study begins. In the most complex planning studies, there may even be instances where review would be useful during the reconnaissance study. In these cases, however, the review panel should generally be disbanded after it conducts its evaluation to preclude the possibility of the panelists becoming defenders of their study.

In some cases it may be desirable to defer initiation of the review process until the Alternative Formulation Briefing. The advantage is that the planning process would have progressed to a stage at which substantial material would be available for review. Problems and opportunities would have been identified, forecasts of future conditions would have been made, alternatives would have been formulated, and estimates of

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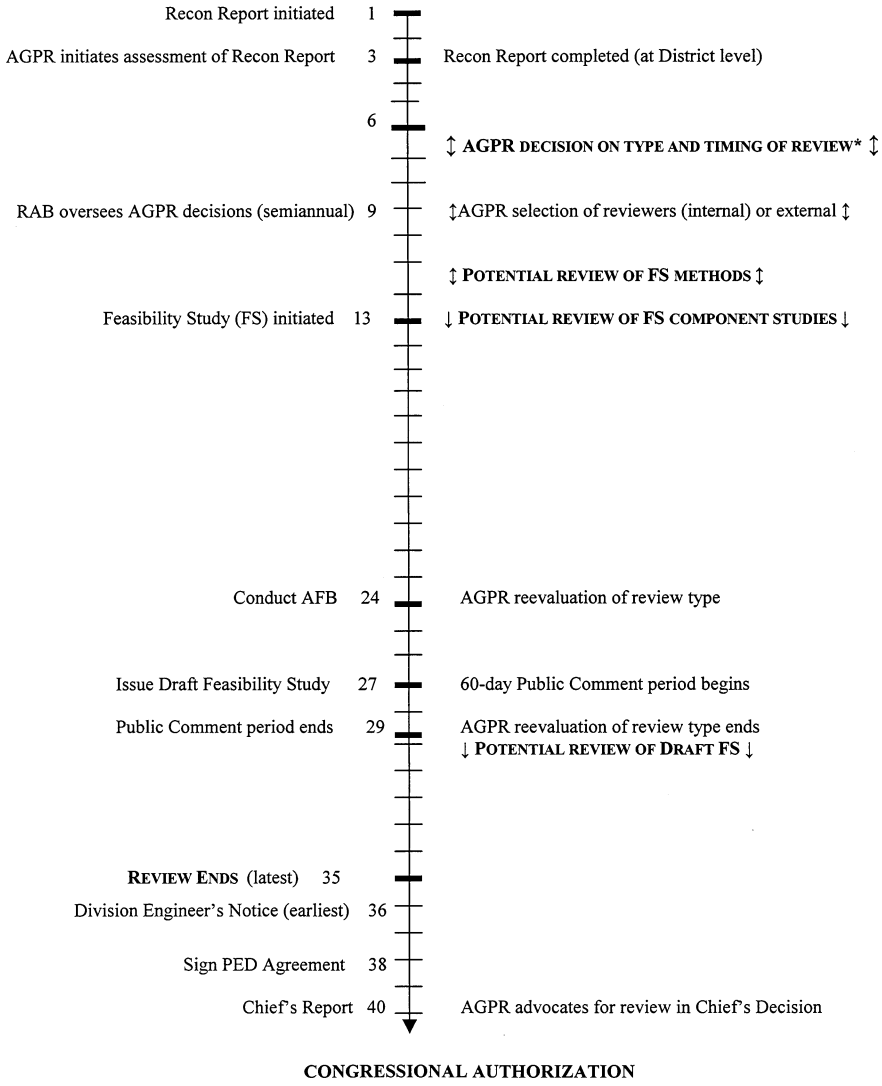

FIGURE 6-2 Corps water resources project planning process and review milestones.
*In more complex planning studies, it may be appropriate to initiate review during study reconnaissance.

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benefits and costs would be available. A limitation of waiting until the Alternative Formulation Briefing is that substantial resources would already have been expended.

In more complex and lengthy planning studies, reviews could be usefully conducted at different stages of the planning study. For example, a review panel could meet briefly in the early stages of a planning study to comment upon key assumptions and methods, then reconvene later during the planning study for a more comprehensive review (always bearing in mind the caveat about panels not becoming too beholden to the results of their review and not evolving into defenders of their recommendations).

The Administrative Group for Project Review should make a final determination of the need for and scale of the review after reviewing public comments obtained during the Alternative Formulation Briefing and comments from the project manager and other interested parties. This panel envisions four possible outcomes: (1) the preliminary determination was correct and no changes are needed, (2) the preliminary determination suggests that no review is needed, but public comments suggest an internal review is needed, thereby necessitating establishment of an internal review panel, (3) the preliminary determination suggests that an internal review is needed, but public comments suggest an external review is needed, thereby requiring the Administrative Group for Project Review to contract with an outside organization for the selection of an independent review panel, and (4) the preliminary determination suggests that an external review is needed, but the status of the project and public comments suggest that an internal review is sufficient.

A review would be performed in parallel with the preparation of the Feasibility Study and an Environmental Impact Statement (EIS), and it would be completed and reported prior to completion of the Feasibility Study and EIS. Results of the review (whether managed by the Administrative Group for Project Review as an internal review or done independently) may be provided to and used by the Corps team conducting the Feasibility Study and EIS, in an iterative way, to improve decision making.

The issue of the appropriate timing of review raises questions regarding responses to review and roles of the review panel. When a review is conducted in a planning study's early stages, the review should be submitted to the Corps' District Engineer, who is the Corps official most directly in charge of the planning study. The District Engineer should prepare a written document explaining how the Corps intends to incorporate the review's recommendations into its planning study.

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TABLE 6-1 Estimated Annual Costs of Review

Entity	Cost Item	Estimated Cost
AGPR	4 professionals, at $150k each	$0.6M
	Support costs for each professional,$50k each.	$0.2M
	Subtotal	$0.8M
RAB	5 members	
	Support costs for meetings, including staff, travel and other compensation as appropriate	$0.3M
	Subtotal	$0.3M
Review	6 experts per review	
	5 reviews per year, assuming $100k costs/review/year	$0.5M
Report publication and dissemination		$0.4M
TOTAL		$2.0M

As noted previously, when reviews are initiated early during a planning study, and with panels that track the Corps' responses to its reviews over time, there is a prospect that a panel would assume an advisory role and may also become beholden to and defensive of its views. It is important that a review panel focus on its specific tasks and not become defensive in the event that past recommendations are not implemented to a panel's satisfaction. This may become a greater issue with lengthy planning or reoperations studies, the most complicated of which may require years to complete. One way in which this potential problem might be averted is to invoke different review panels at different stages of the study process. Another strategy that may improve review is to have panel members serve on multiple panels, as this would help standardize evaluation across multiple planning studies.

Administrative Costs

An issue related to the funding of review is how the sources of funding might affect review independence. It would be natural to expect the Corps of Engineers (as opposed to a higher-level oversight organization) to fund the reviews described in this report. But this may constrict the review's independence somewhat, as even the most objective performers may be motivated to satisfy sponsors, possibly in hopes of maintaining future funding continuity. There are examples of independent organizations providing balanced and credible reviews for agencies that provide resources for the reviews, and this issue may not constitute a major con-

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cern, but it should nonetheless be considered when resources for review panels are provided.

Regarding an estimate of review costs, it is difficult to provide a precise estimate, as the cost will ultimately be a function of the number of staff, the level of staff support, and the number of reviews and reviewers. But this panel derived a first approximation of the annual costs of maintaining an effective review process, arriving at a figure of roughly $2 million. Table 6-1 provides an approximate budget, which will vary depending on the number of reviews, panelists, and professional facilitators and on the types of reviews conducted (e.g., face-to-face meetings; videoconferencing; mail).

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7

Recommendations

The Panel on Peer Review provides the following recommendations for improving review procedures of U.S. Army Corps of Engineers water resources planning studies and projects:

- The Corps' more complex planning studies should be subjected to independent review by objective, expert panels. Reviewers should not be selected by the Corps, and they should not be employed by the Corps.
- Reviews should be overseen by an organization independent of the Corps. Examples of organizations that might lead these independent reviews include professional science or engineering societies, the National Academies, and the National Academy for Public Administration. Responsibility for these external reviews could also be delegated to an independent federal oversight group, with the Department of Energy's Defense Nuclear Facility Safety Board serving as a possible model.
- Congress should direct the Corps to establish an Administrative Group for Project Review (AGPR) and should provide the necessary resources for its operations. The AGPR should be housed in either the Office of the Assistant Secretary of the Army for Civil Works or in the Office of the Chief of Engineers.
- The AGPR's roles should include determining whether a Corps planning study should be reviewed and the appropriate level of independence of review. The AGPR should not conduct reviews itself.
- The Administrative Group for Project Review should provide a summary document of the planning study at hand to the review panel.
- The Administrative Group for Project Review should produce a document that clearly explains the Corps' review procedures. These pro-

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cedures should be viewed as flexible and should evolve over time as the Corps' review process matures. The AGPR should periodically update this document.

- The decision regarding the degree of the review's independence should be open to review upon petition by interested parties. The Administration (perhaps from the director of the OMB) and Congress (through congressional resolution or other legislative action, but not simply through committee language) should also be able to request a review of a Corps planning study. The review process should take no longer than 60 days.
- A Review Advisory Board (RAB) should be established to provide periodic review of the Administrative Group for Project Review's mandate, structure, and decision-making processes. It should advise upon the processes for selecting reviewers and independent external review bodies. The Review Advisory Board should assess processes for ensuring consistency, thoroughness, and timeliness of reviews, and it should consider both past studies and prospective studies and projects. It should periodically evaluate the scopes of review proposed by the Advisory Group for Project Review, and it should review a sample of summary documents prepared by the AGPR to ensure their clarity and comprehensiveness. The functions of the Review Advisory Board may need to be established within a body that has a more comprehensive review mandate of Corps programs.
- The Corps of Engineers should be included at some level within all reviews. Corps staff will be intimately involved with internal reviews, and external reviews will ultimately be more effective if the review panel maintains communication with the Corps during the review. This communication, which should not compromise the review's independence, can help the review panel understand the Corps' planning assumptions and methods, as well as the practical implications of the review panel's findings and recommendations. The Administrative Group for Project Review should broker this communication between the Corps and a review panel, as well as communication between the panel and relevant federal agencies, interest groups, and the public.
- Review results should be presented to the Chief of Engineers before a final decision on a planning study is made. Results should be available to the public. The report from the review panel should be included in the Corps' planning study submitted to Congress.
- The Chief of Engineers should respond in writing to each key point in the report of a review panel. The Chief should either agree with a point and explain how it will be incorporated into the planning study or project, or the point should be rebutted with an explanation of why the

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Corps is choosing to reject it. In the event that review is initiated in a planning study's early stages, the results of the review should be submitted to the Corps' District Engineer. The District Engineer should be responsible for preparing a written document that explains how the Corps intends to incorporate the review results into the study.

- Reviews should be initiated early enough in the Corps' study process so that review results can be meaningfully incorporated into the planning study or project design. With controversial studies, the Corps should ordinarily initiate review early in the feasibility, reoperations, or other study under review. When review is initiated early in a planning study, results of the review should be submitted to the Corps' District Engineer. In controversial studies, reviews should be conducted at different stages of the planning study.
- It is important that review panels not become too strongly attached to their reports and become defenders of their recommendations. The composition of review panels may thus need to be changed during the course of a planning study or project, especially lengthier ones. To effect some standardization across review panels, some panelists should be identified to serve on multiple panels.
- Internal review panels should usually consist of a balance in the number of Corps of Engineers professional staff and experts independent of the Corps. In external reviews, the Corps may submit nominees to serve as reviewers, but the Corps should not select the reviewers. External review panels should consist only of experts independent of the Corps.
- Reviews should be conducted to identify, explain, and comment upon assumptions that underlie economic, engineering, and environmental analyses, as well as to evaluate the soundness of models and planning methods. A review panel should be given the flexibility to bring important issues to the attention of decision makers. Review panels should be able to evaluate whether the interpretations of analysis and the conclusions based on analysis are reasonable. However, review panels should be instructed to not present a final judgment on whether a project should be constructed or whether a particular operations plan should be implemented, as the Corps of Engineers is ultimately responsible for this final decision.
- Congress should provide resources to the Secretary of the Army to help implement this report's recommendations directed toward improving review procedures within the Corps.

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Acronyms

AFB	alternative formulation briefing
ASA(CW)	Assistant Secretary of the Army for Civil Works
AGPR	Administrative Group for Project Review
BERH	Board of Engineers for Rivers and Harbors
CERP	Comprehensive Everglades Restoration Plan
CRC	Central Review Center
DCSOPS	Deputy Chief of Staff for Operations
DOE	U.S. Department of Energy
EC	Engineering Circular
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
ER	Engineering Regulation
ESTB	Environmental Studies and Toxicology Board
FCSA	feasibility cost-sharing agreement
FS	feasibility study
GPRA	Government Performance and Results Act
IRC	Issue Resolution Conference
IRP	independent review panel
NAPA	National Academy of Public Administration
NASA	National Aeronautics and Space Administration
NEPA	National Environmental Policy Act
NRC	National Research Council
OMB	U.S. Office of Management and Budget
OSB	Ocean Studies Board
PED	preconstruction engineering and design
P&G	Principles and Guidelines
PSP	project study plan

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RAB	Review Advisory Board
R&D	research and development
UMR-IWW	Upper Mississippi River–Illinois Waterway
USACE	U.S. Army Corps of Engineers
WCD	World Commission on Dams
WRC	U.S. Water Resources Council
WRDA 1986	Water Resources Development Act of 1986
WRDA 1992	Water Resources Development Act of 1992
WRDA 2000	Water Resources Development Act of 2000
WSTB	Water Science and Technology Board

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Appendixes

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Appendix A

WATER RESOURCES DEVELOPMENT ACT 2000

Public Law No. 106-541, of the 106th Congress

SEC. 216. NATIONAL ACADEMY OF SCIENCES STUDY.

(a) DEFINITIONS- In this section, the following definitions apply:

(1) ACADEMY- The term 'Academy' means the National Academy of Sciences.

(2) METHOD- The term 'method' means a method, model, assumption, or other pertinent planning tool used in conducting an economic or environmental analysis of a water resources project, including the formulation of a feasibility report.

(3) FEASIBILITY REPORT- The term `feasibility report' means each feasibility report, and each associated environmental impact statement and mitigation plan, prepared by the Corps of Engineers for a water resources project.

(4) WATER RESOURCES PROJECT- The term `water resources project' means a project for navigation, a project for flood control, a project for hurricane and storm damage reduction, a project for emergency streambank and shore protection, a project for ecosystem restoration and protection, and a water resources project of any other type carried out by the Corps of Engineers.

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(b) INDEPENDENT PEER REVIEW OF PROJECTS-

(1) IN GENERAL- Not later than 90 days after the date of enactment of this Act, the Secretary shall contract with the Academy to study, and make recommendations relating to, the independent peer review of feasibility reports.

(2) STUDY ELEMENTS- In carrying out a contract under paragraph (1), the Academy shall study the practicality and efficacy of the independent peer review of the feasibility reports, including--

(A) the cost, time requirements, and other considerations relating to the implementation of independent peer review; and

(B) objective criteria that may be used to determine the most effective application of independent peer review to feasibility reports for each type of water resources project.

(3) ACADEMY REPORT- Not later than 1 year after the date of a contract under paragraph (1), the Academy shall submit to the Secretary, the Committee on Transportation and Infrastructure of the House of Representatives, and the Committee on Environment and Public Works of the Senate a report that includes--

(A) the results of the study conducted under paragraphs (1) and (2); and

(B) in light of the results of the study, specific recommendations, if any, on a program for implementing independent peer review of feasibility reports.

(4) AUTHORIZATION OF APPROPRIATIONS- There is authorized to be appropriated to carry out this subsection $1,000,000, to remain available until expended.

(c) INDEPENDENT PEER REVIEW OF METHODS FOR PROJECT ANALYSIS-

(1) IN GENERAL- Not later than 90 days after the date of enactment of this Act, the Secretary shall contract with the Academy to conduct a study that includes--

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(A) a review of state-of-the-art methods;

(B) a review of the methods currently used by the Secretary;

(C) a review of a sample of instances in which the Secretary has applied the methods identified under subparagraph (B) in the analysis of each type of water resources project; and

(D) a comparative evaluation of the basis and validity of state-of-the-art methods identified under subparagraph (A) and the methods identified under subparagraphs (B) and (C).

(2) ACADEMY REPORT- Not later than 1 year after the date of a contract under paragraph (1), the Academy shall transmit to the Secretary, the Committee on Transportation and Infrastructure of the House of Representatives, and the Committee on Environment and Public Works of the Senate a report that includes--

(A) the results of the study conducted under paragraph (1); and

(B) in light of the results of the study, specific recommendations for modifying any of the methods currently used by the Secretary for conducting economic and environmental analyses of water resources projects.

(3) AUTHORIZATION OF APPROPRIATIONS- There is authorized to be appropriated to carry out this subsection $2,000,000. Such sums shall remain available until expended.

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Appendix B

Section 3 of the 1902 Rivers and Harbors Act

"That there shall be organized in the Office of the Chief of Engineers, United States Army, by detail from time to time from the Corps of Engineers, a board of five engineer officers, whose duties shall be fixed by the Chief of Engineers, and to whom shall be referred for consideration and recommendation, in addition to any other duties assigned, so far as in the opinion of the Chief of Engineers may be necessary, all reports upon examination and surveys provided for by Congress, and all projects or changes in projects for works of river and harbor improvement heretofore or hereafter provided for. And the board shall submit to the Chief of Engineers recommendation as to the desirability of commencing or continuing any and all improvements upon which reports are required. And in the consideration of such works and projects the board shall have in view the amount and character of commerce existing or reasonably prospective which will be benefited by the improvement and the relative of the ultimate cost of such work, both as to cost of construction, continuance, or maintenance at the expense of the United States. And such consideration shall be given as time permits to such works as have heretofore been provided for by Congress, the same as in the case of new works proposed. The board shall, when it considers the same necessary, and with the sanction and under orders from the Chief of Engineers, make, as board or through its members, personal examinations of localities. And all facts, information, and arguments which are presented to the board for its consideration in connection with any matter referred to it by the Chief of Engineers shall be reduced to and submitted in writing, and made a part of the records of the Office of the Chief of Engineers. It shall further be the duty of said board, upon a request transmitted to the Chief of Engineers by the Committee on Rivers and Harbors of the

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House of Representatives, or the Committee on Commerce of the Senate, in the same manner to examine and report through the Chief of Engineers upon any projects heretofore adopted by the Government or upon which appropriations have been made, and report upon the desirability of continuing the same or upon any modifications thereof which may be deemed desirable.

"The Board shall have authority, with the approval of the Chief of Engineers, to rent quarters, if necessary, for the proper transaction of its business, and to employ such civil employees as may, in the opinion of the Chief of Engineers, be required for properly transacting the business assigned to it, and the necessary expenses of the board shall be paid from allotments made by the Chief of Engineers from any appropriations made by Congress for the work or works to which the duties of the board pertain."

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Appendix C

DEPARTMENT OF THE ARMY
OFFICE OF THE ASSISTANT SECRETARY
CIVIL WORKS
108 ARMY PENTAGON
WASHINGTON DC 20310-0108

2 3 AUG 2001

MEMORANDUM FOR THE CHIEF OF ENGINEERS

SUBJECT: Organization of the Office of the Assistant Secretary of the Army (Civil Works)

I am pleased to inform you that we are making some improvements in the organization of the Office of the Assistant Secretary of the Army for Civil Works.

Currently, the career SES position of Deputy for Policy and Legislation is vacant. We intend to fill this position with a political appointee who will focus on political relationships with the Congress and other Federal agencies. This person also will concentrate on environmental issues. The new deputy will work closely with the Corps and will provide a channel for more efficient and effective communication between our offices, Congress, and other agencies.

In response to the President's Budget Blueprint, we also are establishing a new group within this office to provide improved oversight of the project planning and review processes. We will staff this new group with a new Deputy Assistant Secretary and three additional persons with expertise in key areas of water resources planning. This group will work closely with the Corps with the goal of improving our capability of providing well formulated, technically sound, well justified, and environmentally acceptable solutions to water resources problems. With an improved capability in this office and by working as a team with the Corps, we will be better able to provide early and consistent guidance in the development of water resources projects. An improved Army review also will facilitate a much more effective and timely review and clearance process at the Office of Management and Budget. Our goal is to reestablish the extremely cooperative and efficient review process that existed in the early 1990's.

We look forward to a smooth transition period, and believe these changes will result in a much more cooperative and successful working relationship with the Corps. Within the next few weeks, we will provide additional information on these actions.

Dominic Izzo
Principal Deputy Assistant Secretary of the Army
(Civil Works)

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Appendix D

Review Processes in Other Federal Agencies

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Agency	Program	Purpose	Type of Review Program	Comments
U.S. Environmental Protection Agency	Superfund (CERCLA) (1980) 42 USC §9601 *et seq*.	Response to releases of hazardous substances that may endanger public health or environment through removal or long-term actions	Review of site feasibility studies and reassessments for cleanup of hazardous wastes at sites on the National Priorities List (e.g., PCBs in the sediments of the upper Hudson River); review of contaminant transport and fate models, geochemical studies, and human and ecological risk assessments.	Ad hoc; based upon guidance found in EPA's *Peer Review Handbook*
U.S. Department of Agriculture	Farm Bill (FAIR) (1996) P.L. 104-127; §391	Reauthorization of agricultural programs including commodities, credit, conservation, rural development, trade, and nutrition	Task Force on Agricultural Air Quality established by the USDA Natural Resources Conservation Service (NRCS) to review research conducted by any federal agency that would establish controls over farming or ranch operations on behalf of cleaner air.	Task Force established in response to studies allegedly based upon "erroneous data," which claimed that ag. operations failed to meet Clean Air Act standards for particulates

U.S. Department of Transportation; U.S. Fish and Wildlife Service	TEA-21 23 USC §109	Transportation Equity Act for the 21st Century funds federal-aid transportation projects	TEA-21 is designed to reduce delays, reduce duplication of effort, reduce costs associated with review, and streamline the approval process of transportation projects. TEA-21 provides for transfer of funds to other agencies to cover review costs; an example is review by outside experts, arranged by FWS (under the Fish and Wildlife Act of 1956 and the Fish and Wildlife Coordination Act), of DoT practices such as project scoping and mitigation.	Example of one federal agency sponsoring peer review of its activities by another federal agency

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Appendix E

Rosters of:

(1) Committee to Assess the U.S. Army Corps of Engineers Methods of Analysis and Peer Review for Water Resources Project Planning: Coordinating Committee
(2) Water Science and Technology Board
(3) Ocean Studies Board

COORDINATING COMMITTEE

LEONARD SHABMAN, *Chair*, Resources for the Future, Washington, D.C.
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Appendix F

Biographical Information

James K. Mitchell is University Distinguished Professor Emeritus at Virginia Polytechnic Institute and State University in Blacksburg, Virginia, and a consulting geotechnical engineer. Dr. Mitchell's expertise is in civil engineering and geotechnical engineering, with emphasis on problems and projects involving construction on, in, and with the earth; mitigation of ground failure risk; waste containment and site remediation soil improvement; soil behavior; geotechnical earthquake engineering; environmental geotechnics; and compositional and physico-chemical properties of soils. He has served on several National Research Council study committees. Dr. Mitchell holds a B.S. degree in civil engineering from Rensselaer Polytechnic Institute and M.S. and Ph.D. degrees from Massachusetts Institute of Technology. Dr. Mitchell is a member of the National Academy of Sciences and the National Academy of Engineering.

Melbourne Briscoe is director of the OAS Processes and Prediction Division at the Office of Naval Research. He also directed the U.S. GOOS Project Office while at the National Ocean Service of the National Oceanic and Atmospheric Administration. His research areas are in oceanography, air-sea interactions, acoustics, telemetry, short-range climate predictions, basic-to-applied research transitions, research management, and societal application of oceanography. His post doctoral appointments were at Von Karman Institute for Fluid Dynamics in Rhode-St-Genese, Belgium, and NATO SACLANT ASW Research Centre in La Spezia, Italy. He received his B.S. in mechanical engineering and ap-

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plied mathematics, and his Ph.D. in fluid dynamics from Northwestern University.

Stephen J. Burges is professor of civil engineering at the University of Washington, Seattle. Dr. Burges' research interests are in surface water hydrology; urban hydrology; water supply engineering; the application of stochastic methods in water resources engineering; water resources systems, design, analysis, and operation; water resources aspects of civil engineering; and ground water hydrology. He is a fellow of the American Society of Civil Engineers, the American Association for the Advancement of Science, and the American Geophysical Union. He is a past president of the hydrology section of the American Geophysical Union. Dr. Burges was a member of the National Research Council's Water Science and Technology Board from 1985 to 1989. He received a B.Sc. in physics and mathematics and a B.E. in civil engineering from the University of Newcastle, Australia. He received an M.S. and Ph.D. in civil engineering from Stanford University.

Linda Capuano is vice president of Strategic Marketing and Business Development for Honeywell Engines & Systems, a $5 billion aerospace business that provides propulsion engines, auxiliary power units, environmental control systems, engine controls and accessories, as well as electrical power. She is responsible for strategic planning, E-Business, and mergers and acquisitions. Joining AlliedSignal in 1995, Linda also held the position of general manager of Commercial Air Transport Auxiliary Power Unit (APU) products. Previously, she was the vice president of Operations and Business Development and part of the founding team of Conductus, a telecommunications superconductive electronics business in Sunnyvale, California. She has also held product management positions in magnetic memory recording at IBM. Dr. Capuano holds a B.S. in chemistry from State University of New York at Stony Brook, a B.S. in chemical engineering and an M.S. in chemistry from the University of Colorado, and an M.S. in engineering management and Ph.D. in materials science from Stanford University.

Denise Fort is a member of the faculty of the University of New Mexico's School of Law. She has been a member of the New Mexico Bar since 1976. Ms. Fort has extensive experience in environmental and natural resources law and policy. She served as chair of the Western Water Policy Review Advisory Commission, a Presidential commission that prepared a report on western water policy concerns. In earlier posi-

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tions, she served as director of New Mexico's Environmental Improvement Division, as a staff representative to the National Governors Association, as an environmental attorney, and in other capacities concerned with environmental and natural resource matters. She received her B.A. from St. John's College (Annapolis and Santa Fe, New Mexico) and her J.D. from the Catholic University of America's School of Law.

Porter Hoagland is a research specialist at the Woods Hole Oceanographic Institution in Massachusetts. Dr. Hoagland's research interests include environmental and natural resource policy, law, and economics; distribution and allocation of property rights in ocean resources; and technology transfer and intellectual property problems in marine science and technology policy and underwater archeological resource management. He received a B.S. in biology from Hobart College, an M.M.P. and Ph.D. in marine policy from the University of Delaware, and a masters in public administration degree from Harvard University.

David H. Moreau is a professor in the Departments of City and Regional Planning and of Environmental Sciences and Engineering at the University of North Carolina. Until recently, he was the director of the University's Water Resources Research Institute. Dr. Moreau has been active in water resources planning at the state, local, and federal levels. He chairs two commissions for North Carolina dealing with sedimentation control and environmental management (since 1991), and he chaired a Governor's Blue Ribbon Panel on Environmental Indicators (1989-1990). He has been the executive secretary of the Urban Water Consortium of North Carolina since 1985. Dr. Moreau has published on a variety of topics on the planning and financing of water resources. He chaired the NRC Committee to Assess the U.S. Army Corps of Engineers Water Project Planning Procedures. He received a B.S. in civil engineering from Mississippi State University, an M.S. in civil engineering from North Carolina State University, and an M.S. in engineering and a Ph.D. in water resources management from Harvard University.

Craig Philip is president and CEO of Ingram Industries' Barge and related marine transportation companies. Dr. Philip previously served as senior vice president and chief commercial officer of the same company. Before joining Ingram, Dr. Philip was vice president of Southern Pacific Railroad's Intermodal Division, where he was responsible for all commercial and operating matters involved with the operation of the rail industry's largest double-stack container network. Dr. Philip is active in many professional organizations and the academic community and has

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taught at Princeton and Vanderbilt. Dr. Philip received his B.S. in civil engineering from Princeton and M.S. and Ph.D. in engineering and management from the Massachusetts Institute of Technology.

John T. Rhett is a private consultant primarily representing Harding Lawson Associates, an international environment/engineering consultant firm. Mr. Rhett was a federal inspector of the Alaska National Gas Transportation System and was deputy assistant administrator for Water Program Operations of the U.S. Environmental Protection Agency. He was also chief of engineering for the U.S. Army Construction Agency in Vietnam and District Engineer in Louisville, Kentucky, of the U.S. Army Corps of Engineers. He received a B.S. in military engineering from the U.S. Military Academy, West Point; an M.E. in civil engineering from the University of California, Berkeley; and an M.S. in international relations from George Washington University, Washington, D.C.

Richard E. Sparks is the director of the Illinois Water Resources Center at the University of Illinois, Urbana-Champaign. Dr. Sparks' interests include biological monitoring for pollution control; restoration of degraded aquatic ecosystems; and ecology of large floodplain rivers. He is a member of the American Fisheries Society, the Ecological Society of America, and Sigma Xi. Dr. Sparks was a member of the National Research Council's Committee on Aquatic Restoration and the Committee to Assess U.S. Army Corps of Engineers Water Resources Project Planning Procedures. He received a B.A. from Amherst College, an M.S. from the University of Kansas, and a Ph.D. in biology from the Virginia Polytechnic Institute and State University.

Bory Steinberg is the cofounder of Steinberg and Associates, a consulting firm established after his retirement from the U.S. Army Corps of Engineers in 1992. He consults for local governments on projects that are cost-shared with the federal government. While in the Corps he served as chief of the Project Management Division from 1989 to 1992. Before that he was chief of the Policy, Review, and Initiatives Division in the Directorate of Civil Works from 1985 to 1989. He was also chief of the Programs Division from 1980 to 1985. He is a member of the Army Engineers Association, the Society of American Military Engineers, and the Association of the U.S. Army. Dr. Steinberg was a member of the National Research Council's Committee on Aquatic Restoration and the Committee to Assess U.S. Army Corps of Engineers Water Resources Project Planning Procedures. Dr. Steinberg received a B.S. in

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civil engineering from Rutgers University, an M.S. in public financial management and budgeting, and a Ph.D. in public administration from George Washington University.

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Jeffrey W. Jacobs is a senior program officer at the Water Science and Technology Board of the National Research Council. His research interests include organizational and policy arrangements for water resources planning, water resources science and policy relations, and river system management. He has studied these issues extensively in Southeast Asia's Mekong River basin and the United States, and he has conducted comparative research between water management issues in the United States and Southeast Asia. He received his Ph.D. degree in geography from the University of Colorado.

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