



441 G St. N.W.
Washington, DC 20548

Accessible Version

December 18, 2019

The Honorable John Barrasso
Chairman

The Honorable Thomas R. Carper
Ranking Member
Committee on Environment and Public Works
United States Senate

The Honorable Peter DeFazio
Chairman

The Honorable Sam Graves
Ranking Member
Committee on Transportation and Infrastructure
House of Representatives

U.S. Army Corps of Engineers: Information on Evaluations of Benefits and Costs for Water Resources Development Projects and OMB’s Review

The U.S. Army Corps of Engineers (Corps) is one of the world’s largest public-engineering, design, and construction-management agencies.¹ Through its Civil Works program, the Corps plans, designs, constructs, operates, and maintains water resources development projects to address its three primary program missions: (1) restoration, protection, and management of aquatic ecosystems; (2) support of commercial navigation; and (3) flood risk management.²

For its navigation mission, the Corps’ guidance indicates that the agency is to provide safe, reliable, and efficient waterborne transportation systems—such as channels, harbors, and waterways—for movement of commerce, national security needs, and recreation.³ According to Corps headquarters officials, the agency’s navigation projects potentially provide navigation benefits to noncommercial harbors, and some of these harbors are used by various state maritime academies for military-training purposes.⁴ The state maritime academies educate and

¹The Corps has both a military and a Civil Works program. The military program provides, among other things, engineering and construction services to other U.S. government agencies and foreign governments, while the Civil Works program is responsible for investigating, developing, and maintaining water resources development projects. This report discusses only the Civil Works program.

²U.S. Army Corps of Engineers, *Sustainable Solutions to America’s Water Resource Needs: Civil Works Strategic Plan 2014-2018*, EP 1165-2-503 (Washington, D.C.: Dec. 31, 2014).

³U.S. Army Corps of Engineers, *Planning Guidance Notebook*, ER 1105-2-100 (Apr. 22, 2000).

⁴There are six state maritime academies: (1) California Maritime Academy; (2) Great Lakes Maritime Academy; (3) Maine Maritime Academy; (4) Massachusetts Maritime Academy; (5) State University of New York Maritime College; and (6) Texas A&M at Galveston Maritime Academy.

graduate licensed merchant marine officers who support the U.S. marine transportation and defense needs in peace and war.⁵

The America's Water Infrastructure Act of 2018 includes a provision for us to review the Corps' and the Office of Management and Budget's (OMB) benefit-cost procedures, including any calculation of navigation benefits for noncommercial harbors used by state maritime academies for military-training purposes.⁶ This report describes the Corps' and OMB's process for (1) identifying and evaluating the benefits, costs, and effects of proposed water resources development projects, and (2) considering the navigation benefits for noncommercial harbors used by state maritime academies for military-training purposes, if any.

To address our first objective, we leveraged our related work on the Corps' process for identifying and evaluating the benefits, costs, and other effects for selected flood risk management projects.⁷ This step generally included (1) reviewing Corps guidance; (2) analyzing a sample of eight Corps flood risk management feasibility studies to describe the Corps' process for identifying and evaluating potential projects' benefits, costs, and other effects; and (3) interviewing Corps headquarters and district officials. To identify OMB's role regarding Corps water resources development projects and any associated economic analyses of benefits and costs, we interviewed OMB staff and reviewed executive branch policies, circulars, and orders.⁸ To address our second objective, we reviewed relevant laws and Corps guidance. We also communicated with OMB staff, Corps headquarters officials, and four of the six state maritime academies that responded to our request regarding the calculation of any navigation benefits in economic analyses for noncommercial harbors used by state maritime academies for military-training purposes.⁹

We conducted this performance audit from June 2019 to November 2019 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

⁵GAO, *Coast Guard: Most Training Providers Expect to Implement Revised International Maritime Standards by the Deadline Despite Challenges*, [GAO-17-40](#) (Washington, D.C.: Jan. 31, 2017).

⁶Pub. L. No. 115-270, § 1204, 132 Stat. 3765, 3805-3806 (2018).

⁷We issued a report examining the Corps' economic analyses of benefits and costs for selected flood risk management projects. In our report, we recommended that the Corps strengthen its feasibility study internal review process by including steps to ensure consistency with transparency best practices. The agency concurred with our recommendation. See GAO, *Army Corps of Engineers: Evaluations of Flood Risk Management Projects Could Benefit from Increased Transparency*, [GAO-20-43](#) (Washington, D.C.: Nov. 26, 2019).

⁸These policies included Executive Order 12322, OMB Circulars A-4 and A-94, and the 1983 Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies (Principles and Guidelines). Executive Order 12322, Water Resources Projects, 46 Fed. Reg. 46561 (Sept. 21, 1981), as amended by Executive Order 12608, Elimination of Unnecessary Executive Orders and Technical Amendments to Others, 52 Fed. Reg. 34617 (Sept. 14, 1987). Office of Management and Budget (OMB), Circular A-4: *Regulatory Analysis* (September 2003); OMB, *Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs*, OMB Circular No. A-94 (October 1992; discount rates revised November 2018); U.S. Water Resources Council, *Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies* (Mar. 10, 1983); and U.S. Army Corps of Engineers, *Planning Guidance Notebook*, ER 1105-2-100 (Apr. 22, 2000).

⁹The four state maritime academies that responded to our request for information on the calculation of any navigation benefits for noncommercial harbors used by state maritime academies for military-training purposes were the (1) California Maritime Academy; (2) Great Lakes Maritime Academy; (3) Maine Maritime Academy; and (4) Texas A&M at Galveston Maritime Academy.

The Corps Evaluates Benefits and Costs for Water Resources Development Projects as Part of a Multi-Step Feasibility Study Process and Submits Information for OMB's Review

The Corps conducts feasibility studies to evaluate potential water resources development projects following a six-step process, as outlined in its guidance. The six steps are:

- (1) identification of the objectives and other parameters of the project;
- (2) inventory and forecast of water and related land-resources conditions within the planning area;
- (3) formulation of alternative plans for further consideration;
- (4) evaluation and analysis of each alternative plan for its economic, environmental, and other effects;
- (5) comparison of the alternative plans to each other; and
- (6) selection of a recommended plan.

As part of this process, the Corps evaluates alternative plans for proposed projects using economic analyses of monetary benefits and costs and separate analyses of other effects.¹⁰ For example, for flood risk management projects we reviewed, the Corps used economic analyses to evaluate project-specific categories of potential monetary benefits (e.g., reduced damages and emergency expenses) and costs (e.g., construction, operation and maintenance, and real estate) of alternative plans.¹¹ The studies also used separate analyses, such as regional economic development analyses, to evaluate other effects such as changes to regional income and employment. Corps officials said they relied on these analyses to determine the best project design, help make decisions, or respond to local nonfederal sponsors' preferences.¹² For five of the eight studies we reviewed, the Corps primarily used the results of the economic analysis of benefits and costs to recommend the plan with the greatest net benefits from among the alternatives, in accordance with its guidance. Three of the eight studies we reviewed relied on other analyses, as allowed by Corps guidance, to recommend plans to address different project objectives or the preferences of the local nonfederal sponsors.¹³

¹⁰Alternative plans include a range of structural and nonstructural measures and strategies.

¹¹Reduced damages result from actions such as performing physical modifications to property for the purposes of reducing the frequency of flood damages, relocating structures, or installing flood-warning and preparedness systems. Emergency costs include those expenses resulting from a flood that would not otherwise be incurred. Construction costs are the direct cost of installing project measures. Operation, maintenance, repair, replacement, and rehabilitation costs represent the current monetary value of materials, equipment, services, and facilities needed to operate the project and make repairs, rehabilitate, and make replacements necessary to maintain project measures in sound-operating condition during the period of analysis. Real estate costs include activities such as buying residential structures and demolishing them.

¹²According to Corps guidance, the process for these projects begins with a nonfederal sponsor identifying a problem and approaching the Corps to help develop a solution. Upon congressional authorization for a study and appropriations to fund it, the Corps and the nonfederal sponsor establish an agreement to conduct a feasibility study for a potential project. Nonfederal sponsors are to participate in the planning process, as well as the project design, construction, and post-project operations and maintenance.

¹³The Corps' *Planning Guidance Notebook* states that project recommendations may deviate from the alternative plan with the maximum net benefits if requested by the nonfederal sponsor and approved by the Assistant Secretary of the Army for Civil Works. Nonfederal sponsors can include Indian tribes, counties, states, or local governments that

The Corps develops these feasibility studies to inform OMB, Congress, and others whether water resources development projects warrant federal investment. Corps officials said that once they finalize the feasibility studies, the agency prepares and signs reports—known as Chief’s reports—summarizing the recommended plans and submits the Chief’s reports for approval to the Assistant Secretary of the Army for Civil Works (Assistant Secretary). As directed by Executive Order, the Corps then submits its reports, which include its recommended approved plans for proposed water resources development projects, to OMB before submitting them to Congress to authorize the projects’ construction.¹⁴

Upon receipt of the Chief’s reports, OMB staff said they do not conduct separate economic analyses to evaluate the benefits and costs for Corps’ water resources development projects. Instead, OMB staff said the office’s Water and Power branch reviews the Corps’ feasibility studies, including the economic analyses, to ensure consistency with executive branch policies.¹⁵ For example, OMB staff said they consider such criteria as whether the proposed projects’ purposes fall within one of the Corps’ three main mission areas and have a benefit-to-cost ratio of 1:1 or higher as a threshold. As needed, OMB staff said they consult with other OMB branches or Corps officials involved in preparing Chief’s reports to ensure an understanding of the Corps’ economic analyses, among other things. If the Corps’ feasibility studies are not consistent with executive branch policies, OMB staff said they communicate this decision to the Corps’ Assistant Secretary in a letter.

Through a separate process, OMB staff said they consider the Corps’ recommended projects whose construction have been authorized by statute for potential inclusion in the President’s budget request that is annually submitted to Congress.¹⁶ At this point, OMB staff said they assess whether the projects meet performance-based criteria, which the Corps and OMB develop together.¹⁷ For example, the staff consider such criteria as whether the proposed

contact the Corps for assistance on a water resources project. The *Planning Guidance Notebook* also says that an alternative plan with multiple project objectives may be recommended.

¹⁴Executive Order 12322, as amended, directs the Corps to submit its reports and plans for proposed water resources development projects to OMB before submitting them to Congress. The order as amended directs OMB to review these reports and plans for consistency with the following: (a) the policy and programs of the President; (b) the *Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies* or other such planning guidelines for water and related land resources planning, as shall hereafter be issued; and (c) other applicable laws, regulations, and requirements relevant to the planning process. 46 Fed. Reg. 46561 (Sept. 21, 1981); 52 Fed. Reg. 34617 (Sept. 14, 1987).

¹⁵OMB staff said these policies include Executive Order 12322, OMB Circulars A-4 and A-94, and the 1983 *Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies (Principles and Guidelines)*. Executive Order 12322, Water Resources Projects, 46 Fed. Reg. 46561 (Sept. 21, 1981), as amended by Executive Order 12608, Elimination of Unnecessary Executive Orders and Technical Amendments to Others, 52 Fed. Reg. 34617 (Sept. 14, 1987). Office of Management and Budget (OMB) Circular A-4: *Regulatory Analysis* (September 2003); OMB, *Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs*, OMB Circular No. A-94 (October 1992; discount rates revised November 2018); and U.S. Water Resources Council, *Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies* (Mar. 10, 1983).

¹⁶For more information on the Corps’ annual budget formulation process, see GAO, *Army Corps of Engineers: The Corps Needs to Take Steps to Identify All Projects and Studies Eligible for Deauthorization*, [GAO-14-699](#) (Washington, D.C.: Aug. 21, 2014), and GAO, *Army Corps of Engineers: Budget Formulation Process Emphasizes Agencywide Priorities, but Transparency of Budget Presentation Could Be Improved*, [GAO-10-453](#) (Washington, D.C.: Apr. 2, 2010). The President’s budget request is required by statute to be submitted annually to Congress. 31 U.S.C. § 1105.

¹⁷OMB staff said the performance-based criteria are published each year in the Corps’ Program Budget Press Books. For example, in addition to meeting nine performance-based criteria, for Corps projects to qualify for inclusion in the President’s budget request for fiscal year 2020, a project must have been authorized for construction; had an approved Chief’s report, major rehabilitation report, or Dam Safety modification report; and, where applicable, had

projects have a benefit-to-cost ratio of 2.5:1 or higher, calculated at a 7 percent discount rate.¹⁸ OMB staff said they do not suggest changes to the projects if the projects do not meet the performance-based criteria. OMB staff said if the President’s administration decides not to include a Corps project in its budget request, it is usually because it does not meet the performance-based criteria, such as the 2.5:1 benefit-to-cost ratio threshold, or it is inconsistent with executive branch policies.¹⁹

The Corps and OMB Have Not Considered Navigation Benefits in Economic Analyses for Noncommercial Harbors Used by State Maritime Academies

Corps officials said that it is possible to consider navigation benefits in economic analyses for noncommercial harbors used by state maritime academies for military-training purposes, but officials have not done so because such benefits would likely be incidental and not significant to the selection of a project for recommendation.²⁰ In addition, if the officials were to do so, it would take time and resources and would not align with other Corps policy priorities to expedite studies.²¹ Corps officials said the methods developed for the calculation of commercial navigation benefits primarily measure the cost savings derived from the improved movement of goods. Since state maritime academies do not move goods, the Corps has not developed methods to consider the benefits for the noncommercial harbors academies use, according to Corps officials. OMB staff said that the Corps has not submitted economic analyses of navigation benefits for noncommercial harbors used by state maritime academies for military-training purposes for review. In addition, OMB staff said they have not conducted such analyses. State maritime academy officials that we contacted also said they were not aware of such analyses.

Agency Comments

We provided a draft of this report to the Office of Management and Budget and Department of Defense for review and comment. We received technical comments from the Office of Management and Budget, which we incorporated as appropriate. The Department of Defense informed us it had no comments on the draft report.

successfully completed review under Executive Order 12322. Office of the Assistant Secretary of the Army (Civil Works), Department of the Army, *Fiscal Year 2020: Civil Works Budget of the U.S Army Corps of Engineers* (March 2019).

¹⁸The benefit-to-cost ratio used by OMB to rank recommended projects for budgeting purposes is based on a 7 percent discount rate. The discount rate is used to express expected future benefits and costs in comparable, present value terms.

¹⁹Corps officials said that they are required by the Water Resources Development Act 1974 to use the nominal discount rate for the formulation and evaluation of federal water resources projects rather than the 7 percent discount rate that is used for the President’s budget request, a requirement that commonly causes the projects recommended based on economic analyses to fall below the benefit-to-cost ratio threshold of 2.5:1 that is used for the President’s budget request. See Pub. L. No. 93-251, § 80(a), 88 Stat. 12, 34 (1974) (*codified at* 42 U.S.C. § 1962d-17(a)).

²⁰A Corps official said that the agency does not have specific methods developed for this type of calculation, but general economic concepts that the agency uses for other purposes could be applied and new methods could be developed, if warranted.

²¹For example, under the Corps policy referred to as the 3x3x3 rule, studies need to be completed in less than 3 years, at a cost of not more than \$3 million, and with the ongoing involvement of all three organizational levels of the Corps—headquarters, divisions, and districts. For more information on this policy, see GAO, *Water Resource Projects: Army Corps of Engineers Can Further Enhance Acceleration of Feasibility Studies*, [GAO-19-561](#) (Washington, D.C.: July 29, 2019).

We are sending copies of this report to the appropriate congressional committees, the Acting Director of the Office of Management and Budget, the Secretary of Defense, the Assistant Secretary of the Army for Civil Works, the Chief of Engineers and Commanding General of the U.S. Army Corps of Engineers, and other interested parties. In addition, the report will be available at no charge on the GAO website at <http://www.gao.gov>.

If you or your staff have any questions about this report, please contact me at (202) 512-3841 or fennella@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. GAO staff who made key contributions to this report include Vondalee R. Hunt (Assistant Director), Brad C. Dobbins (Analyst-in-Charge), Tim Guinane, Gwen Kirby, Keesha Luebke, and Jeanette Soares.



Anne-Marie Fennell
Director, Natural Resources and Environment

(103638)