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December 2013

ARMY CORPS OF ENGINEERS

Cost Increases in Flood Control Projects and Improving Communication with Nonfederal Sponsors

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December 2013

ARMY CORPS OF ENGINEERS

Cost Increases in Flood Control Projects and Improving Communication with Nonfederal Sponsors

GAO Highlights

Highlights of GAO-14-35, a report to the Ranking Member, Committee on Environment and Public Works, U.S. Senate

Why GAO Did This Study

For fiscal year 2012, Congress appropriated almost $1.7 billion to the Corps for its Civil Works program to construct a wide range of projects, including flood control projects. Flood control projects require congressional authorization and appropriations. Nonfederal sponsors, such as a state or local government, also provide funds. When Congress approves a project for construction, it authorizes a total cost for the project based on estimates prepared by the Corps, and this authorized cost provides the basis for the project's maximum cost.

GAO was asked to review issues related to flood control projects. This report examines (1) the extent to which cost increases occurred and the primary factors that contributed to the differences between estimated and actual costs, (2) the extent to which the Corps communicated with and provided updated information to nonfederal sponsors, and (3) Corps guidance on communication with such sponsors and ways, if any, to improve such communication. GAO surveyed Corps officials on all 87 flood control projects identified by the Corps as budgeted for construction in any fiscal year from 2004 to 2012, selected 8 for further review covering each Corps division, reviewed project documents and Corps communication guidance, and interviewed Corps officials and nonfederal sponsors.

What GAO Recommends

GAO recommends that the Corps take steps to ensure compliance with its guidance calling for communications plans. The Department of Defense concurred with the recommendation.

View GAO-14-35. For more information, contact Anne-Marie Fennell at (202) 512-3841 or fennella@gao.gov.

What GAO Found

The majority of the U.S. Army Corps of Engineers' (Corps) flood control projects budgeted for construction from fiscal years 2004 to 2012 experienced cost increases, including inflation. Specifically, 59 of 87 flood control projects during this period experienced increases from their original authorized cost to their current estimated project cost or their total expenditures at closeout, according to information provided by Corps officials. However, according to a Corps official, as of September 2013, no projects had cost increases that exceeded their maximum allowable cost as defined by law. Various factors other than inflation contributed to cost increases among the 8 projects GAO selected for further review. Factors included design changes, less than optimal federal funding, underestimated costs, and contract cost changes. For example, 6 of the 8 projects had design changes due to unforeseen site conditions and changes in design criteria following Hurricane Katrina. According to Corps officials, receiving less than optimal federal funding increased the costs of 3 of the 8 projects GAO reviewed. Corps officials also said that receiving less than optimal federal funding meant that 2 projects had to break up their work into smaller segments, and 1 project had to extend its completion schedule. The Corps has some efforts under way intended to better manage costs.

The extent to which the Corps communicated with and provided updated information to nonfederal sponsors varied among the 8 projects GAO selected for further review. Specifically, Corps officials and sponsors told GAO that the Corps usually communicated Corps policy changes affecting projects by telephone or e-mail as soon as they occurred. In addition, the Corps' communication with the sponsors on project scope and design changes was generally effective among the projects, according to Corps officials and nonfederal sponsors with whom GAO spoke. However, some sponsors told GAO the Corps was less timely in providing updated cost information. For example, a representative of one sponsor told GAO that the sponsor had not received the required quarterly cost report on a regular basis.

The Corps has guidance regarding communication between the Corps and its nonfederal sponsors. Specifically, Corps guidance directs project delivery teams to develop a project management plan that includes a communications plan. However, GAO found that 3 of the 8 projects GAO reviewed did not have a communications plan as called for by guidance. Because the communications plan provides a framework for the Corps and nonfederal sponsors to establish a communications strategy and determine the needs of the project delivery team, without such a plan, the Corps may be missing opportunities to assess their communication needs. Developing such a plan may help Corps or sponsor staff understand the team's communications needs when they join the project delivery team; for projects where there is significant turnover, understanding the team's needs is especially important.

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Abbreviations

ARRA	American Recovery and Reinvestment Act
WRDA	Water Resources Development Act

U.S. GOVERNMENT ACCOUNTABILITY OFFICE
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Washington, DC 20548

December 20, 2013

The Honorable David Vitter
Ranking Member
Committee on Environment and Public Works
United States Senate

Dear Senator Vitter:

For fiscal year 2012, the U.S. Army Corps of Engineers (Corps) received an appropriation of almost $1.7 billion for its Civil Works program to construct a wide range of water resources projects, including flood control projects, such as levees, floodwalls, dams, and reservoirs. Flood control projects require congressional authorization and appropriations. The Corps also typically receives funds from each project's nonfederal sponsor, which may be a state, tribal, county, or local government or agency. When Congress approves a flood control project for construction, it authorizes a total cost for the project based on cost estimates prepared by the Corps, and this authorized cost provides the basis for the project's maximum allowable cost. The Corps must seek new spending authority from Congress before spending more than the maximum allowable cost. In an era of budgetary constraints, cost increases in Corps flood control projects can delay the completion of the projects.

You asked us to review issues related to the costs of flood control projects and the Corps' communication with its nonfederal sponsors. This report examines (1) the extent to which cost increases occurred in flood control projects budgeted for construction in any fiscal year from 2004 to 2012 and the primary factors that contributed to the differences between estimated and actual costs; (2) the extent to which the Corps communicated with and provided updated information to its nonfederal sponsors on changes to Corps policies, project scope and design, and estimated versus actual costs; and (3) Corps guidance on communication with nonfederal sponsors and ways, if any, suggested by Corps officials and sponsors to improve such communication. For purposes of this report, a flood control project refers to a project with structural features such as levees, floodwalls, channels, dams, and reservoirs that is constructed for the purpose of managing the risk of flooding along rivers and coastal areas.

To determine the extent to which cost increases occurred in flood control projects and the primary factors that contributed to differences between

estimated and actual costs, we reviewed relevant provisions of the laws, regulations, policies, and procedures governing the Corps' process for developing flood control projects and generating cost estimates. We also interviewed officials at Corps headquarters and its cost engineering center of expertise. The Corps identified 87 new or ongoing flood control projects that were budgeted for construction in any fiscal year from 2004 to 2012,[1] and we surveyed Corps officials associated with the projects to obtain project cost estimates at key milestones, the current total project cost or total expenditures at project closeout, and the primary reasons for cost increases. We received responses from Corps officials for all 87 projects, for a 100 percent response rate. From those 87 projects, we selected a non-probability sample of 8 projects that were budgeted for construction in any fiscal year from 2009 to 2012 for further review.[2] This sample included 1 project randomly selected from each of 7 divisions[3] and 1 project judgmentally selected from the New Orleans District that also met our selection criteria.[4] The 8 projects were the Brays Bayou project in Texas, the Little Calumet River project in Indiana, the Larose to Golden Meadow project in Louisiana, the Monarch-Chesterfield project in Missouri, the Muddy River project in Massachusetts, the Napa River project in California, the Roanoke River Upper Basin project in Virginia, and the Turkey Creek Basin project in Kansas and Missouri. For these 8 projects, we reviewed project documents and interviewed Corps officials and representatives of nonfederal sponsors to obtain more detailed information about project cost increases and the reasons for those increases.

To determine the extent to which the Corps communicated with and provided updated information to its nonfederal sponsors, we interviewed

[1]Our work focused on flood control projects budgeted for construction in any fiscal year from 2004 to 2012 because these projects had gone through the Corps' project development processes and had project cost estimates developed by the Corps at key milestones.

[2]We selected projects that were budgeted for construction from fiscal years 2009 to 2012 to enhance our ability to speak with Corps officials and nonfederal sponsors who had worked on the projects and were knowledgeable about the reasons for cost increases.

[3]The Corps' Civil Works program has eight divisions. However, the Pacific Ocean Division had no flood control project that was budgeted for construction in any fiscal year from 2009 to 2012.

[4]The congressional requester expressed interest that we include one of the projects in the New Orleans District in our sample. We included a project that met our selection criteria.

Corps district officials and sponsors of the eight projects selected for further review to obtain information on the communication that occurred on those projects. To examine Corps guidance on communication with nonfederal sponsors and ways, if any, suggested by Corps officials and sponsors to improve such communication, we reviewed Corps civil works guidance on communication with nonfederal sponsors, interviewed Corps headquarters officials and district officials and sponsors of the eight projects selected for further review, and obtained copies of communications plans, if available, for the eight projects. Because this is a non-probability sample, the experiences and views of Corps officials and sponsors of the eight projects are not representative of, and cannot be generalized to, all Corps flood control projects. Appendix I contains more detailed information on the objectives, scope, and methodology of our review.

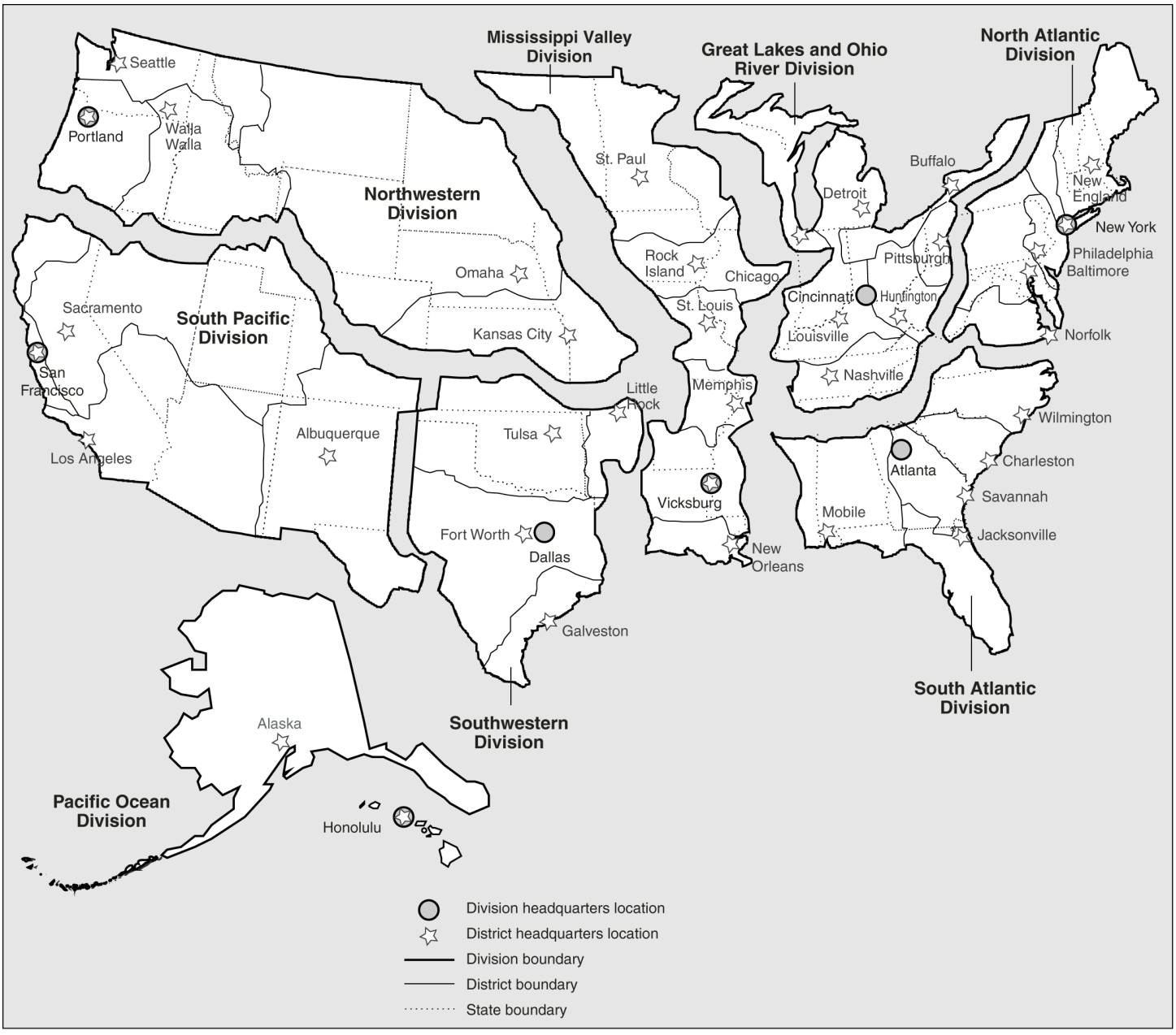
We conducted this performance audit from May 2012 to December 2013 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions 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.

Background

The Corps is the world's largest public engineering, design, and construction management agency. Located within the Department of Defense, the Corps has both military and civilian responsibilities.[5] Through its Civil Works program, the Corps plans, designs, constructs, operates, and maintains a wide range of water resources projects for purposes such as flood control, navigation, and environmental restoration. The Civil Works program is organized into 3 tiers: a national headquarters in Washington, D.C.; 8 regional divisions that were established generally according to watershed boundaries; and 38 districts nationwide (see fig. 1).

[5]The Corps' Military program provides, among other things, engineering and construction services to other U.S. government agencies and foreign governments. This report only discusses the Civil Works program.

Figure 1: Locations of the U.S. Army Corps of Engineers' Civil Works Divisions and Districts



Sources: GAO representation of U.S. Army Corps of Engineers data; Map Resources (map).

Corps headquarters primarily develops policies and provides oversight. The Assistant Secretary of the Army for Civil Works, appointed by the President, establishes the policy direction for the Civil Works program. The Chief of Engineers, a military officer, oversees the Corps' civil works operations and reports on civil works matters to the Assistant Secretary of the Army for Civil Works. The eight divisions, commanded by military officers, coordinate civil works projects in the districts within their respective geographic areas. Corps districts, also commanded by military officers, are responsible for planning, engineering, constructing, and managing projects in their districts. Districts are also responsible for coordinating with the nonfederal sponsors, which may be state, tribal, county, or local governments or agencies. Each project has a project delivery team of civilian employees that manages the project over its life cycle. The team is led by a project manager and comprises members from the planning, engineering, construction, operations, and real estate functions.

In addition, the Civil Works program maintains a number of centers of expertise to assist Corps division and district offices.[6] One of these centers is the Cost Engineering and Agency Technical Review Mandatory Center of Expertise located in Walla Walla, Washington, which provides technical support and assistance to the districts on cost engineering issues, such as developing cost estimates and performing mandatory agency technical reviews of cost estimates included in all decision documents.

The Corps' Civil Works program receives funding annually through the Energy and Water Development Appropriations Act or an omnibus appropriations act. These acts have typically appropriated a sum to each civil works appropriation account, including investigations, construction, and operation and maintenance, to fund projects related to the nation's water resources. The funds appropriated to the Corps are "no year" funds, which means that they remain available to the Corps until spent. Historically, committee reports accompanying each annual appropriations act have specifically listed individual investigations, construction, and

[6]The centers of expertise assist the Corps divisions and districts in the planning, design, and technical review of civil works projects. The Corps established the centers to consolidate expertise, improve consistency, reduce redundancy, and enhance institutional knowledge, among other things. For a full list of the Corps' centers of expertise, see http://www.usace.army.mil/about/centersofexpertise.aspx.

operation and maintenance projects, and the amount of funds designated for each project.

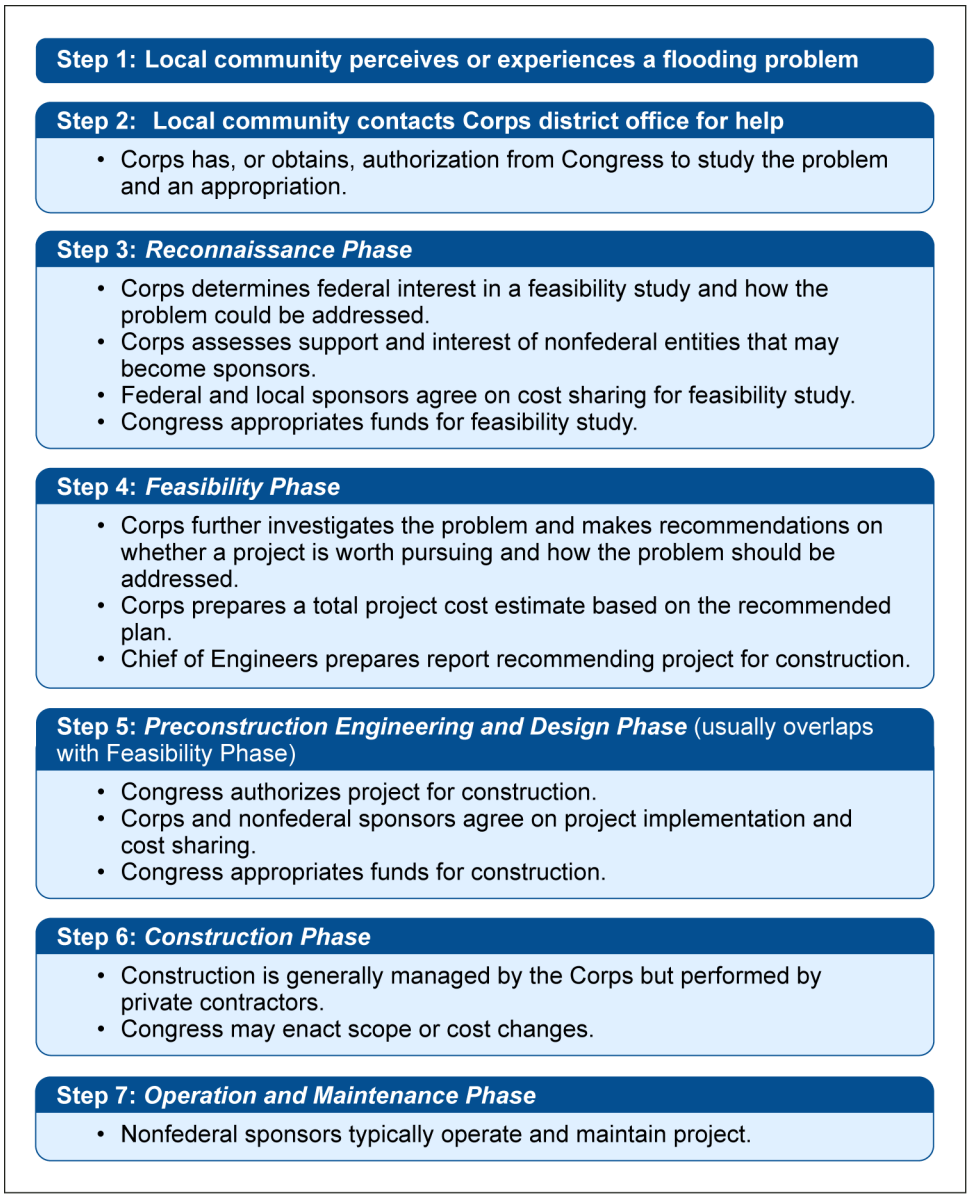
Continuing Contract Authority

Through fiscal year 2005, applicable law and an Army policy allowed the Corps to enter into, and commit the federal government for the full amount of, contracts that spanned more than one fiscal year (called "continuing contracts"), even though the Corps may not have received appropriations to cover the full contract amount at the time the contracts were awarded. However, beginning with the fiscal year 2006 Energy and Water Development Appropriations Act, Congress limited the use of the Corps' continuing contract authority. In response, the Corps developed new continuing contract clauses that limited the government's obligations to only the funds available at a specific time for the contracts, as opposed to any anticipated future funding, and required the contractor to stop work when the available funds were exhausted.

Process for Developing Flood Control Projects

The major steps in developing a flood control project are shown in figure 2.

Figure 2: Major Steps in Developing a Flood Control Project



Source: GAO presentation of U.S. Army Corps of Engineers data.

Usually, the Corps becomes involved in flood control projects when a local community perceives or experiences a flooding problem that is beyond its ability to solve and contacts the Corps for assistance. If the Corps does not have the statutory authority required for studying the

problem, the Corps must obtain authorization from Congress before proceeding.[7] Studies have been authorized through legislation, typically a Water Resources Development Act (WRDA),[8] or, in some circumstances, through a committee resolution. Next, the Corps must receive an appropriation to study the project, which it seeks through its annual budget request to Congress.

After receiving authorization and an appropriation, studies are conducted in two phases: reconnaissance and feasibility. A Corps district office conducts a reconnaissance study at full federal expense to determine if the problem warrants federal participation in a feasibility study and how the problem could be addressed.[9] During this phase, the Corps also assesses the level of interest and support from nonfederal entities that may become sponsors. If the Corps determines that further study is warranted,[10] the district office typically seeks agreement from the local sponsor to share costs for a feasibility study. The target for completion of the reconnaissance phase is 6 to 12 months from initial obligation of federal funds to a signed feasibility cost-sharing agreement.

Cost sharing for feasibility studies for flood control projects is 50 percent federal and 50 percent nonfederal. The cost of a feasibility study is established through negotiation of the project management plan, which is an agreement between the Corps and the nonfederal sponsor that defines project objectives and project-specific quality control procedures. The purpose of the feasibility study is to further investigate the problem and make recommendations on whether the project is worth pursuing and how the problem should be addressed. Corps guidance states that typical feasibility studies should be completed in 18 to 36 months. According to the Corps, the district office conducts the study and the needed environmental studies and documents the results in a feasibility report that includes a total project cost estimate based on the recommended

[7]If the Corps has previously performed a study in the geographic area for a similar purpose, a new study can be authorized by a resolution. If the Corps has not previously investigated the area, the study needs to be authorized through legislation.

[8]Congress enacted WRDAs in 1974, 1976, 1986, 1988, 1990, 1992, 1996, 1999, 2000, and 2007. Each WRDA authorized numerous projects and programs.

[9]The cost of a reconnaissance study generally is limited to $100,000.

[10]The Corps estimated that about 20 percent of all reconnaissance studies result in a recommendation to conduct a feasibility study.

plan. The Chief of Engineers reviews the report and decides whether to sign a final decision document, known as the Chief's Report, recommending the project for construction. The Chief of Engineers transmits the Chief's Report and the supporting documentation to Congress through the Assistant Secretary of the Army for Civil Works and the Office of Management and Budget. Congress may authorize the project's construction in a WRDA or other legislation.[11] When Congress approves a flood control project for construction, it typically authorizes a total cost for the project based on estimates prepared by the Corps.

Most projects are authorized during the preconstruction engineering and design phase. This phase usually overlaps with the feasibility phase. The purpose of the preconstruction engineering and design phase is to complete any additional planning studies and all of the detailed, technical studies and designs needed to begin construction of the project. Once the project has been authorized for construction and funds have been appropriated, the district enters into a cost-sharing agreement with the local sponsor. The degree of cost sharing required can vary by project but, since the passage of WRDA 1986, construction costs of flood control projects can be shared under a formula of 65 percent federal and 35 percent nonfederal. The Corps seeks funds to construct the project through the annual budget process. After Congress appropriates funds, the construction phase can begin. Construction is generally managed by the Corps but performed by private contractors. During construction, Congress may enact scope or cost changes.

A flood control project can take many years to complete. Once construction is completed, the Corps usually turns over operation and maintenance of the project to the nonfederal sponsor, which then bears the full cost.

Maximum Project Cost

When Congress authorizes a specific amount of money for a project, this authorized project cost provides the basis for the project's maximum cost. Section 902 of WRDA 1986, as amended,[12] defines the maximum project

[11]The Corps estimated that about 75 percent of all feasibility studies result in a project authorized for construction.

[12]Pub. L. No. 99-662 § 902, 100 Stat. 4183 (1986), codified as amended at 33 U.S.C. § 2280 (2013). For purposes of this report, we use "section 902 of WRDA 1986" to refer to this provision as amended.

cost as the sum of (1) the authorized cost, with the costs of unconstructed project features adjusted for inflation; (2) the costs of modifications that do not materially alter the scope of the project, up to 20 percent of the authorized cost (without adjustment for inflation); and (3) the cost of additional studies, modifications, and actions authorized by WRDA 1986 or any later law or required by changes in federal law. The maximum cost is known as the 902 limit.

As interpreted by the Corps, the 902 limit applies to the following types of flood control projects unless the project's authorization states otherwise:

- Projects authorized by WRDA 1986 and any subsequent WRDA or other authorizing law.
- Projects authorized before WRDA 1986 with new construction authorized after the act's passage if the project was completely reauthorized. If only a project component was authorized after WRDA 1986, then only that component would be subject to the 902 limit.
- Projects authorized before WRDA 1986 and modified by any subsequent law, unless specified in later legislation.

Each district with an ongoing construction project is to update the 902 limit established for the project to account for inflation every time a new cost estimate or benefit-to-cost ratio is calculated. If the project's estimated costs are approaching the 902 limit, the project delivery team may start preparing a post-authorization change report to seek an increase in the project's authorized cost.[13] If the project's actual costs reach the 902 limit, construction must stop until the project gets a new authorization that increases the project's costs and, therefore, its 902 limit.

A Majority of Projects Experienced Cost Increases Due to Various Factors

The majority of the Corps flood control projects budgeted for construction from fiscal years 2004 to 2012 experienced cost increases, including inflation. However, no projects had cost increases that exceeded their maximum allowable cost, or 902 limit, as defined by law. Various factors other than inflation contributed to cost increases among the eight projects

[13]A post-authorization change report is a decision document that may be required when project features have changed significantly or if the estimated costs have changed substantially after authorization.

we selected for further review. The Corps has some efforts under way intended to better manage costs.

At Least Two-thirds of Flood Control Projects Experienced Cost Increases

At least two-thirds of the 87 flood control projects budgeted for construction from fiscal years 2004 to 2012 experienced increases, including inflation, from their original authorized cost to their current estimated project cost or their total expenditures at closeout, according to information provided by Corps officials.[14] Specifically, 59 projects had cost increases, including 12 completed projects and 47 that were uncompleted.[15] In addition, 7 projects had cost decreases, including 3 completed projects and 4 uncompleted projects.[16] One uncompleted project experienced no change from its authorized cost to its current total project cost. We were unable to compare costs for 20 projects—3 completed and 17 uncompleted—because they did not have an authorized cost or total expenditures at closeout or were undergoing reevaluation and did not have a current total project cost estimate.

Based on survey responses, of the 59 projects with cost increases, 34 had maximum allowable cost limits as defined in Section 902 of WRDA 1986. According to the Corps official responsible for tracking 902 limits, as of September 2013, none of those 34 projects had cost increases that exceeded its 902 limit. In addition, according to survey responses, 13 of the 59 projects did not have 902 limits because the project (1) was authorized before WRDA 1986, (2) had no authorized cost, or (3) had a not-to-exceed limit, to which the 902 limit does not apply.[17] The remaining 12 projects we reviewed were completed and, therefore, our survey question regarding 902 limits did not apply.

[14]We were unable to quantify the difference between the original authorized cost and the current total project cost or total expenditures at project closeout because we determined that the survey data were not reliable for that purpose. For more information, see appendix I.

[15]An uncompleted project refers to a project that was authorized for construction but not yet completed at the end of fiscal year 2012.

[16]Costs decreased because certain features had been eliminated due to project changes or design improvements, project scope had been reduced, or construction schedules had been accelerated.

[17]In some instances, Congress authorized projects for construction at a total cost not to exceed a specified amount, meaning that the cost was capped and could not be adjusted for inflation or other reasons.

Similarly, survey responses indicated that 29 of the 59 projects with cost increases had received at least one additional authorization from Congress that increased the project's authorized cost and, therefore, its maximum allowable cost if the project was subject to the 902 limit.[18] A Corps flood control project can receive an increase in its authorized cost in one of two ways. First, the Corps can submit a post-authorization change report with a new total project cost estimate to Congress. Based on this report, Congress can then reauthorize the project at a higher cost in legislation, such as a WRDA. Second, Congress can also reauthorize a project without having received a post-authorization change report from the Corps. In either case, if the project's actual costs reach its 902 limit before congressional action, construction must stop until the project gets a new authorization that increases the project's costs.

Various Factors Contributed to Cost Increases on Eight Projects

Corps officials and nonfederal sponsors from the eight projects selected for further review identified various factors other than inflation that contributed to cost increases on all eight of the projects. Some of these projects were impacted by more than one factor. Appendix III contains detailed information on the eight projects. The factors identified were as follows:

- *Design changes*. Design changes due primarily to unforeseen site conditions and changes in design criteria following Hurricane Katrina contributed to increased costs on six of the projects we reviewed. Specifically, on four projects, design changes occurred due to unforeseen site conditions. Corps officials on the Turkey Creek project said that a tunnel that could not be accessed prior to construction was found to be in such poor condition that it had to have major rehabilitation work performed. Work to fix the deteriorated tunnel cost $10 million more than had originally been estimated.[19] Corps officials on the Little Calumet project said during construction they encountered a former landfill along one portion of the river that had not been discovered during the preconstruction site investigation. This condition did not provide a usable foundation for a levee, so the

[18]We also identified three flood control projects for which, as of fiscal year 2012, the Corps was in the process of developing post-authorization change reports to seek an increased authorized cost for the project.

[19]In this report, cost increases are presented in the dollar values for the years in which they were determined, not in constant dollars.

design had to be changed to convert the section from a levee to a sheet pile wall.[20] These changes increased costs by approximately $645,000, according to a post-authorization change report dated March 2012. On the Napa River project, after the initial designs were completed in 1997, a vineyard was planted next to an area that had previously been identified as a flowage easement.[21] The Corps had to analyze various alternatives and decided to build a levee encircling the vineyard. Building this additional levee cost $200,000, but it was able to serve as a disposal area for some of the material excavated from the project. Finally, on the Roanoke River project, the sponsor said that the Corps spent several years redesigning portions of the project following the discovery of areas contaminated with hazardous waste. Several sections of the project relating to river channels had to be dropped as a result of the redesign.

Other projects we reviewed had to have portions redesigned because the Corps changed its design criteria following Hurricane Katrina. Specifically, the Corps updated its guidance on the design of I-walls used as flood barriers.[22] On projects that were either in the design stage or under construction, but with unconstructed features, officials had to determine whether their designs met the new criteria. For example, on two projects we reviewed, portions of the project had to be redesigned to comply with the new criteria. Corps officials on the Little Calumet project said that costs increased significantly because the new criteria required the redesign of three sections of the project. However, officials were unable to specify by how much costs increased. According to a Corps official, detailed cost estimates of the preliminary designs were not prepared. The official added that cost estimates used during planning were initial estimates and did not provide a reliable basis with which to compare the cost of the redesigned sections. Corps officials and nonfederal sponsors of the

[20]A sheet pile wall is a row of piles made from timber, steel, or prestressed concrete that are driven into the ground to retain earth or prevent water seepage.

[21]According to the Corps, a flowage easement is privately owned land on which the Corps has acquired the perpetual right, power, privilege, and easement permanently or occasionally to overflow, flood, and submerge land in connection with the operation and maintenance of a water resources development project.

[22]U.S. Army Corps of Engineers, Engineer Circular 1110-2-6066, *Engineering and Design: Design of I-Walls*, April 1, 2011. The circular defines an I-wall as "a slender cantilever wall, embedded in the ground or in an embankment that rotates when loaded and is thereby stabilized by reactive lateral earth pressures."

Larose to Golden Meadow project said the changes in design criteria could significantly increase the costs to construct elements of the project. Corps officials said they are in the process of preparing a post-authorization change report and, therefore, could not provide an estimate of the increases at the time of our report. Corps officials expect the report to be completed in 2014.

- *Less than optimal federal funding*. According to Corps guidance, the Corps is to include project funding in its budget submission at a level that a project can use effectively and efficiently in a given fiscal year, which we refer to in this report as optimal federal funding. Receiving less than optimal federal funding increased the costs of three of the eight projects we reviewed, according to Corps officials. Officials for two projects—Napa River and Turkey Creek—said their projects received less than optimal federal funding, so they had to break up the work into smaller segments than initially planned. Officials added that doing so was more costly because it required contractors to mobilize and demobilize their construction equipment and crews more frequently. A Corps official on the Turkey Creek project said that the cost of issuing additional contracts could be quantified but that the Corps does not specifically track these types of costs. The official said that contracts have typically been issued in lump sums, so mobilization and demobilization costs have not been explicitly broken out. In addition, on the Napa River project, a Corps document cited two instances when modifications were required for ongoing construction contracts due to a lack of funding, which lengthened the construction schedule and increased costs by about $12 million. Similarly, Corps officials on the Larose to Golden Meadow project said that, over the last several years, the project schedule had been pushed back because the project had not been receiving optimal federal funding. The officials added that over the 41 years that the project has been under construction, they had not consistently received enough funding, which had resulted in a longer completion schedule and increased costs. Although the officials could not quantify by how much, they said costs generally increased due to inflation and higher material prices. For example, officials said that the cost of steel sheet piling increased from $3.25 per square foot in 1963 to an average $40.00 per square foot from 2006 to 2011.

- *Underestimated costs*. Corps officials and nonfederal sponsors of four projects said that costs increased on their projects due to differences between early Corps cost estimates and those developed later during project design. For example, Corps officials on the Larose to Golden Meadow project said that on one of the pumping plants, they initially

estimated a construction cost of $800,000. But after additional analysis and geotechnical borings,[23] and in order to handle the actual site conditions, they redesigned the project features, which raised the cost to $10.7 million. On the Muddy River project, nonfederal sponsors said that the Corps' early cost estimates were too low because the Corps used national averages that were lower than what actual costs would be in the New England corridor where the project was located. As a result, sponsors said that they developed their own estimates for budgeting purposes of $78.5 million. However, a Corps official said that the Corps adjusted for regional differences for cost estimates prepared during the project. On the Brays Bayou project, the nonfederal sponsor said that differences between the authorized cost and the cost included in the initial project partnership agreement resulted from the Corps' low estimates of land acquisition and associated costs, pipeline costs, utilities, and bridge adjustments. However, Corps officials attribute all cost increases since project authorization to the change from a diversion element to a downstream channel structure. Corps officials and nonfederal sponsors on the Roanoke River project agreed that the project's original cost estimates, which were used for authorization, were not realistic. Corps officials said that the feasibility study conducted in the mid-1980s was not done to the same level of detail as more recent studies. As a result, the cost estimates developed in the feasibility study were not as accurate as they could have been.

Corps officials said they have taken actions to improve cost estimates. For example, in 2007, the Corps established a cost engineering center of expertise where, according to a Corps official, cost estimates in decision documents supporting congressional authorization are reviewed for accuracy and, in 2008, the Corps updated its cost-estimating guidance. Additional guidance issued in draft in 2009 further directs project delivery teams to perform a cost and schedule risk analysis for all decision documents for projects requiring congressional authorization with a total project cost estimate exceeding $40 million, whereby specific cost risk analysis methods are to be used to develop contingency. According to a Corps official, performing a cost and schedule risk analysis allows the project delivery team to identify high-risk areas that could impact a project's cost or schedule, as well as areas for early mitigation efforts.

[23]Geotechnical boring refers to drilling holes in the ground to obtain information on soil conditions.

- *Changes in contract costs*. Corps officials said that differences between contract estimates and actual contract awards can lead to cost increases. On the Muddy River project, the Corps awarded a contract for the first phase of the project that was $8 million higher than the Corps' original estimate. A Corps official on the project explained that the cost estimates used by contractors in submitting bids for the project may have been based on a different set of assumptions regarding such factors as the future cost of materials and fuel. The Corps official added that this multiyear contract did not have an escalation clause for increases in fuel or materials, so the contractors likely made different assumptions to reduce their risk. In addition, costs could be affected by contract modifications. For example, on the Monarch-Chesterfield project, a Corps official said that several modifications during construction accounted for increased costs of approximately $1.2 million. Some of these modifications included additional engineering support for a specialized railroad closure structure, further design of a pump station, plan changes to locate a fiber optic cable, and design changes to better accommodate storm sewers.

- *Natural events*. Natural events, including flooding and hurricanes, caused damage to two projects—Turkey Creek and Larose to Golden Meadow. Repairing the damage added to project costs. For example, a Corps official on the Turkey Creek project said that, during the construction of the tunnel, the bypass pipe system used to divert the flow of Turkey Creek was repeatedly washed out due to flooding and had to be replaced, which increased the total project cost by approximately $3.5 to $4 million.

- *Continuing contracts*. Corps officials said that the policy change limiting the use of continuing contracts increased costs on one project.[24] Corps officials on the Roanoke River project said that, as a result of breaking the one contract into smaller contracts, costs increased due to the loss of economies of scale. However, Corps

[24]The Corps modified its policy to conform with a change in law prohibiting the agency from entering into a contract that commits an amount in excess of the amount appropriated for that project, plus any amounts available from carryover or reprogramming; the policy's effect is that the Corps can no longer commit the federal government for the full amount of contracts that span more than 1 fiscal year. The Corps may still enter into continuing contracts, but in doing so, it only commits to contractor earnings for the first fiscal year.

officials said they could not indicate by how much costs increased because costs were not calculated for contracting scenarios that did not occur.

- *Additional analysis*. The Assistant Secretary of the Army for Civil Works required Corps officials on the Monarch-Chesterfield project to analyze the probability of the project causing measurable flood damages outside the protected area. The additional analysis delayed the start of construction for almost 7 years, and the measures to address flooding caused by the project added $13 million to the cost of the project.

The Corps Has Some Efforts Under Way Intended to Better Manage Project Costs

In a memorandum dated February 20, 2013, the Assistant Secretary of the Army for Civil Works expressed concerns that civil works projects, once authorized, did not appear to be managed for completion within approved cost estimates and also identified a need for a systematic approach to monitor and manage project cost increases, given continued fiscal constraints. The memorandum stated that, without controls to closely track and minimize cost increases on a year-to-year basis, more projects would be in jeopardy of needing statutory increases in their 902 limits. Because of these and other concerns, the Assistant Secretary of the Army for Civil Works requested information from the Corps that included a proposed plan to manage and control costs in the future. In response, in 2013, the Corps formed the Project Cost Management Working Group, which identified several actions intended to better manage costs, such as requiring formal high-level approval of changes above appropriate thresholds and using formal processes and industry best practices to reduce overall cost and project duration. A Corps official said that the Corps developed an interim measure to identify projects that have exceeded their authorized project cost and reasons for the cost increase. However, the official said that this interim measure focuses on those projects eligible for inclusion in the fiscal year 2015 budget submission and projects in the fiscal year 2013 work plan. The official said that determining how to integrate the interim measure into the existing budget and execution processes is planned for fiscal year 2014.

The Extent to Which the Corps Communicated With and Provided Updated Information to Nonfederal Sponsors Varied

For the eight projects we selected for further review, the extent to which the Corps communicated with and provided updated information to nonfederal sponsors varied. Specifically, Corps officials and nonfederal sponsors told us that the Corps usually communicated changes in Corps policy as soon as they occurred. The Corps' communication with the nonfederal sponsors on project scope and design changes was generally effective among the projects, according to Corps officials and nonfederal sponsors we spoke with. However, some sponsors told us the Corps was less timely in providing updated cost information. The Corps communicated changes to sponsors as follows:

- *Corps policy changes*. Seven of the eight projects we reviewed were affected by at least one policy change. Corps officials and nonfederal sponsors for these projects told us that Corps district officials usually notified the sponsors by telephone or e-mail as soon as the policy changes were issued. In some instances, Corps officials also held meetings to discuss the policy changes with the sponsors. For example, Corps officials from one project told us they contacted the sponsor directly to communicate the discontinuation of the use of continuing contracts. The Corps was ready to award the continuing contract but instead had to issue smaller contracts, resulting in time delays and increased costs. A representative of one sponsor also described instances when he learned about a policy change unexpectedly. For example, the sponsor told us that the Corps notified him by telephone about a policy change regarding the use of American Recovery and Reinvestment Act (ARRA) funds to construct the project's recreational features.[25] Initially, Corps district officials and the sponsor expected to receive ARRA funding for the construction of the recreational features. Subsequently, Corps headquarters decided to not allow the use of ARRA funds for these features. However, based on the expectation that they would receive ARRA funding, the Corps district office had already started the competitive bidding process for construction of the recreational features when the sponsor learned of the decision made by Corps headquarters. As a result, the

[25]ARRA provided funds to states and localities, among other things. ARRA's stated purposes include to preserve and create jobs and promote economic recovery; assist those most impacted by the recession; provide investments needed to increase economic efficiency by spurring technological advances in science and health; invest in transportation, environmental protection, and other infrastructure that will provide long-term economic benefits; and stabilize state and local government budgets. Pub. L. No. 111-5, 123 Stat. 115 (2009).

Corps district office had to delay the bidding process, and the sponsor had to find alternative funding sources for the recreational features.

- *Scope and design changes*. Corps officials and nonfederal sponsors from six of the eight projects told us they had experienced scope or design changes on their projects. According to Corps officials and sponsors of these projects, communication regarding project scope or design changes was generally effective. For example, Corps officials from one project told us they conferred with the sponsor on design changes and regularly communicated with the sponsor through meetings and telephone calls. The sponsor for this project told us that Corps officials had quickly communicated any design changes. In another example, Corps officials on the project stated that design changes were continually communicated to the sponsor at weekly meetings. When there were design disagreements between the Corps and the sponsor, the officials said that Corps engineering staff met with the sponsor to reach an acceptable solution.

- *Cost changes*. Under Corps guidance, the project partnership agreement between the Corps and the nonfederal sponsor is to require the Corps to provide a quarterly cost report to the sponsor.[26] The report is to include such items as updated projections of project costs, the amount of the sponsor's required contribution for the next fiscal year, and the total financial obligations of the Corps and the sponsor for any additional work incurred. However, sponsors for two projects told us the Corps was less timely in providing updated cost information. Specifically, a representative of a sponsor of one project told us that the sponsor had not received these reports on a regular basis and, at times, the Corps provided the report several months after the fiscal reporting period had closed. And another sponsor told us, in many instances, the Corps gave the sponsor a week to provide their share of the funding for cost increases, but the sponsor wanted the Corps to notify them of cost changes as soon as they occurred.

  Corps officials from two projects told us they also used informal methods to communicate cost changes to sponsors. For example, Corps officials from one project told us they immediately notified the

[26]For example, the 2009 model agreement includes a provision stating that the Corps will provide a quarterly cost report to the nonfederal sponsors. According to a Corps headquarters official, this provision was added to the model agreement following WRDA 1988.

sponsor by telephone or in writing if there were new costs during the design and construction of the project. Officials from another project said if the sponsor had questions regarding cost changes, the sponsor would request a meeting. Sponsors from two projects also described informal means of receiving information from the Corps regarding cost changes. Specifically, a sponsor from one project told us the Corps immediately notified the sponsor about potential cost changes via telephone or e-mail, and the changes were discussed at weekly meetings. The sponsor of the other project requested to receive cost change reports before they were officially approved by the Corps.

Communications Plans Called for by Guidance Were Not Always Developed, and Corps Officials and Nonfederal Sponsors Suggested Ways to Improve Communication

Corps guidance directs project delivery teams to develop a communications plan for their projects, but three of the eight projects we selected for further review did not have a communications plan. Further, the Corps does not have an effective means for ensuring that project delivery teams have, in fact, developed a communications plan. Corps officials and nonfederal sponsors we spoke with suggested a variety of ways to improve their communication.

Corps Guidance Calls for Developing Communications Plans, but Some Project Delivery Teams Did Not Always Do So

Corps guidance, issued in 2009, directs project delivery teams to develop a project management plan that includes a communications plan for each project phase over the life of a project.[27] Communications plans should be updated when new stakeholders join a project, or whenever deemed necessary, according to a headquarters official. The communications plan provides a framework for the Corps and nonfederal sponsors to establish a communications strategy and determine the needs of the project delivery team—specifically, who needs what information, when they will need it, how it will be given to them, and by whom. According to Corps

[27]U.S. Army Corps of Engineers, PROC 2000, *PMP Development*, May 2009; U.S. Army Corps of Engineers, REF 8005G, *PMP Content*, May 2009; and U.S. Army Corps of Engineers, REF 8006G, *Communications Plan*, May 2009. This guidance applies to all Corps projects, including flood control projects.

guidance, the communications plan may include such items as methods for (1) evaluating the effectiveness of the project's communication strategy and (2) accessing information between scheduled communications. Communications plan templates are available on the agency's internal website for use by the project delivery teams, according to Corps headquarters officials. Each project delivery team also has the flexibility to develop a communications plan that meets the specific needs of the individual project and its sponsors.

We found that three of the eight projects we selected for further review had not developed a communications plan. A Corps official from one of the projects told us a plan was not developed as the district office and nonfederal sponsors handled their communications through an ad hoc communications group operating during the project's construction phase. A Corps official from the second project told us the project management plan was drafted in 1990, and the agency did not call for a communications plan at the time. However, according to a headquarters official, ongoing projects should have developed a communications plan after the Corps' guidance regarding communications plans was issued in 2009. The project manager for the third project was unsure why a plan had not been developed since he had only recently been assigned to the project. The sponsors of the three projects without a communications plan agreed that a communications plan would be beneficial. Specifically, one sponsor noted that communication with the Corps was "excellent," but added that communication responsibilities are substantial and should be formally acknowledged, and another sponsor indicated a communications plan would have been helpful when a new project manager was assigned.

The Corps' regulation on managing its business processes recognizes the importance of project management plans in facilitating and maintaining effective communication with nonfederal sponsors throughout a project's duration.[28] Additionally, a Corps regulation issued in fiscal year 2000 states that district officials are responsible for approving project management plans, and guidance states that these should include a communications plan.[29] However, as stated previously, we found that

[28]U.S. Army Corps of Engineers, Engineer Regulation 5-1-11, *U.S. Army Corps of Engineers Business Process*, rev. Nov. 1, 2006.

[29]U.S. Army Corps of Engineers, Engineer Regulation 1105-2-100, *Planning Guidance Notebook*, Apr. 22, 2000; U.S. Army Corps of Engineers, REF 8006G, *Communications Plan*, May 2009.

three of the eight projects we selected for further review had not developed a communications plan. Because the communications plan provides a framework for the Corps and nonfederal sponsors to establish a communications strategy and determine the needs of the project delivery team, without such a plan, the Corps may be missing opportunities to assess their communication needs. For example, a communications plan may help Corps or sponsor staff understand the team's communications needs when they join the project delivery team; for projects where there is significant turnover, understanding the team's needs is especially important.

Corps Officials and Sponsors Offered Suggestions to Improve Communication

Corps officials and sponsors we spoke with generally acknowledged their communication was adequate but offered suggestions on how communication could be improved. These suggestions apply to all flood control projects and fall into the following three categories:

- *Understand the sponsors' needs*. Most of the Corps officials we spoke with recognized that sponsors' needs vary. For example, Corps officials told us some sponsors had worked with the Corps before and had a better understanding of the Corps' processes. Other sponsors had not partnered with the Corps previously and were unfamiliar with the federal appropriations process and budget cycle, among other things. In these cases, Corps officials told us they had to spend more time educating the sponsor about the agency and its processes. In addition, Corps officials and sponsors told us the high turnover of project managers during the life of a project presents a challenge in terms of communication. For example, one project we reviewed has had 12 different project managers since 2004. One sponsor from another project told us that communications with the Corps became less frequent after a new project manager started. Corps officials from one project told us the terms of communication with sponsors are set out in the project's communications plan, and it is useful to have this information in writing when project managers change. In addition, another sponsor suggested face-to-face meetings between the Corps and sponsors prior to the start of a project and whenever new officials join the project.

- *Communicate more frequently*. Some Corps officials and nonfederal sponsors told us that more frequent communication would enhance overall communication. For example, one sponsor stated that more proactive communication by the Corps would have helped the sponsor learn sooner that the Corps had overspent on the project's

design. The sponsor became aware of the Corps' overspending when reviewing a financial report from the agency. Another sponsor stated that, with more frequent communication, they would expect their input on project decisions to increase and that more frequent communication would help the Corps' understanding of the project area. Corps officials from another project said that more frequent communication with sponsors would prevent "surprises." Further, a Corps official and sponsors we spoke with said projects benefit from frequent, face-to-face communication at the start of a project and throughout the project.

- *Provide more information*. Nonfederal sponsors and Corps officials suggested communication could improve if the Corps provided more information about the project. For example, Corps officials and a sponsor from one project said that, in addition to the quarterly cost reports, the Corps sends letters to the sponsors explaining the reasons for any cost increases. Corps officials from another project said that sponsors liked to periodically receive by e-mail a one-page summary that includes updates on the project's status and costs. A sponsor told us the Corps should respond when sponsors provide input or ask for information. For example, the sponsor told us the Corps sent a letter asking the sponsor to pay its share of a cost but did not provide a description of the cost. However, the sponsor said it cannot just pay what the Corps asks. Instead, it needs documentation of how local money is spent.

Corps guidance on communications plans includes many of the suggestions made by Corps officials and sponsors. For example, the guidance directs Corps officials to talk with sponsors to understand their information needs and expectations when developing the project's communications plan.

Conclusions

The Corps recognizes the importance of having good communication with nonfederal sponsors of civil works projects. Guidance calling for project delivery teams to develop a communications plan as part of their project management plan, and then updating it as needed, provides an opportunity for the Corps and the sponsors to assess communication needs throughout the project. However, some project delivery teams have not developed a communications plan for their projects as called for by guidance. Without such plans, the Corps may be missing opportunities to assess and improve communication with its nonfederal sponsors,

especially on projects where there is significant turnover of project managers.

Recommendation for Executive Action

To improve communication between the Corps and nonfederal sponsors of flood control projects, we recommend that the Secretary of Defense direct the Chief of Engineers and Commanding General of the U.S. Army Corps of Engineers take steps to ensure that flood control project delivery teams comply with agency guidance to develop communications plans for flood control projects.

Agency Comments

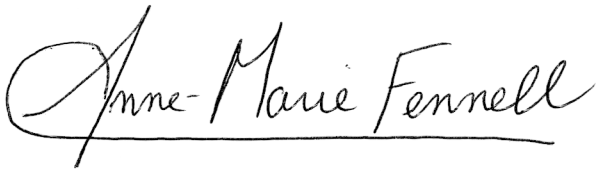
We provided a draft of this report to the Department of Defense for review and comment. In its written comments, reprinted in appendix IV, the department concurred with our recommendation. The department stated that the Corps recognizes the importance of planning and executing communications for flood control projects and will be taking steps to address the recommendation. The Corps also provided technical comments, which we incorporated as appropriate.

As agreed with your office, unless you publicly announce the contents of this report earlier, we plan no further distribution until 30 days from the report date. At that time, we will send copies of this report to the Secretary of Defense, the Chief of Engineers and Commanding General of the U.S. Army Corps of Engineers, the appropriate congressional committees, 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 members 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 are listed in appendix V.

Sincerely yours,



Anne-Marie Fennell
Director, Natural Resources and Environment

Appendix I: Objectives, Scope, and Methodology

This report examines (1) the extent to which cost increases occurred in flood control projects and the primary factors that contributed to the differences between estimated and actual costs; (2) the extent to which the Corps communicated with and provided updated information to its nonfederal sponsors on changes to Corps policies, project scope and design, and estimated versus actual costs; and (3) Corps guidance on communication with nonfederal sponsors and ways, if any, suggested by Corps officials and sponsors to improve such communication. For purposes of this report, a flood control project refers to a project with structural features such as levees, floodwalls, channels, dams, and reservoirs that is constructed for the purpose of managing the risk of flooding along rivers and coastal areas. Our work focused on flood control projects budgeted for construction in any fiscal year from 2004 to 2012 because these projects had gone through the Corps' project development processes and had project cost estimates developed by the Corps at key milestones.

To determine the extent to which cost increases occurred and the primary factors that contributed to differences between estimated and actual costs, we reviewed relevant provisions of the laws, regulations, policies, and procedures governing the Corps' process for developing flood control projects and generating cost estimates. We also interviewed officials at Corps headquarters and its cost engineering center of expertise located in Walla Walla, Washington. The Corps identified 87 new or ongoing flood control projects that were budgeted for construction in any fiscal year from 2004 to 2012. We surveyed Corps officials associated with the projects to obtain project cost estimates at key milestones, the current total project cost or total expenditures at project closeout, if applicable, and the primary factors that contributed to cost increases, among other things. Because this was not a sample survey, it has no sampling errors. However, the practical difficulties of conducting any survey may introduce errors, commonly referred to as nonsampling errors. For example, difficulties in interpreting a particular question, sources of information available to respondents, or entering data into a database or analyzing them can introduce unwanted variability into the survey results. We took steps in developing the questionnaire and collecting and analyzing the data to minimize such nonsampling errors. For example, social science survey specialists designed the questionnaire in collaboration with GAO staff who had subject matter expertise. Then, we pretested the draft questionnaire with a number of Corps officials to ensure that the questions were relevant, clearly stated, and easy to understand. We received responses from Corps officials for all 87 projects, for a 100 percent response rate. For the 87 projects, we compared the project's

original authorized cost and its current total project cost or total expenditures at project closeout, if applicable. Twenty projects did not have an authorized cost or total expenditures at project closeout, or they were undergoing reevaluation and did not have a current total project cost, so we could not compare costs for those projects. We were unable to quantify the difference between the original authorized cost and the current total project cost or total expenditures at project closeout for each of the 67 projects we could compare because we determined that the survey data were not reliable for that purpose. Specifically, Corps guidance provided differing definitions of total project cost, and it was unclear from the survey data whether all respondents had used the same definition.[1]

From the 87 projects, we selected a non-probability sample of 8 projects that were budgeted for construction in any fiscal year from 2009 to 2012 for further review, including 1 project randomly selected from each of 7 divisions[2] and 1 project judgmentally selected from the New Orleans District that met our selection criteria of projects budgeted for construction in any fiscal year from 2009 to 2012.[3] We narrowed our selection to projects that were budgeted for construction during this period to enhance our ability to speak with people who had worked on the projects and were knowledgeable about the reasons for cost increases. Table 1 lists the 8 projects selected for further review.

[1]The Corps planned to issue updated guidance on cost definitions in September 2013.

[2]The Corps' Civil Works program has eight divisions. However, the Pacific Ocean Division had no flood control project that was budgeted for construction in any fiscal year from 2009 to 2012.

[3]The congressional requester expressed interest that we include one of the projects in the New Orleans District in our sample. We included a project that met our selection criteria.

Table 1: Projects Selected for Further Review from the Corps' Civil Works Divisions

Project and location	Division
Brays Bayou, TX	Southwestern
Little Calumet River, IN	Great Lakes and Ohio River
Larose to Golden Meadow, LA[a]	Mississippi Valley
Monarch-Chesterfield, MO	Mississippi Valley
Muddy River, MA	North Atlantic
Napa River, CA	South Pacific
Roanoke River Upper Basin, VA	South Atlantic
Turkey Creek Basin, KS & MO	Northwestern

Source: GAO analysis of Corps data.

Note: Because the Pacific Ocean Division had no flood control project that was budgeted for construction in any fiscal year from 2009 to 2012, we did not include it in our review.

[a]This project is from the New Orleans District, making two projects selected for further review from the Mississippi Valley Division.

For each project, we interviewed Corps officials and nonfederal sponsors, reviewed project documents, and prepared a descriptive summary of the project and the reasons for any cost increases.

To determine the extent to which the Corps communicated with and provided updated information to nonfederal sponsors, we interviewed Corps district officials and representatives of the sponsors of the eight projects selected for further review to obtain information on the Corps' communication with, and provision of updated information to, the sponsors regarding changes to Corps policies, project scope and design, and estimated and actual costs, and analyzed the supporting documents they provided.

To examine Corps guidance on communication with nonfederal sponsors and ways, if any, suggested by Corps officials and sponsors to improve such communication, we reviewed Corps civil works guidance on communicating with its sponsors and interviewed Corps headquarters and district officials and representatives of the sponsors of the eight projects selected for further review. We also obtained copies of communications plans, if available, for the eight projects. Because this is a non-probability sample, the experiences and views of the Corps officials and sponsors of the eight projects are not representative of, and cannot be generalized to, all Corps flood control projects.

We conducted this performance audit from May 2012 to December 2013 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.

Appendix II: Flood Control Projects Budgeted for Construction, Fiscal Years 2004 to 2012

Table 2 lists the 87 flood control projects in the eight divisions of the U.S. Army Corps of Engineers that the agency identified as budgeted for construction in any fiscal year from 2004 to 2012.

Table 2: List of Flood Control Projects Budgeted for Construction in Any Fiscal Year from 2004 to 2012, by Division and District

Division	District	Project Name and Location
Great Lakes	Chicago	Des Plaines River, IL
Great Lakes	Chicago	Little Calumet River, IN
Great Lakes	Chicago	McCook and Thornton Reservoirs, IL
Great Lakes	Huntington	Buchanan County, VA
Great Lakes	Huntington	Dickenson County, VA
Great Lakes	Huntington	Grundy, VA
Great Lakes	Huntington	West Columbus, OH
Great Lakes	Louisville	Indianapolis, White River (North), IN
Great Lakes	Louisville	Metropolitan Louisville, Beargrass Creek, KY
Great Lakes	Louisville	Metropolitan Louisville, Pond Creek, KY
Great Lakes	Louisville	Metropolitan Region of Cincinnati, Duck Creek, OH
Great Lakes	Louisville	Mill Creek, OH
Great Lakes	Louisville	Ohio River Greenway Public Access, IN
Great Lakes	Pittsburgh	Saw Mill Run, Pittsburgh, PA
Mississippi Valley	Nashville	Comite River, LA
Mississippi Valley	New Orleans	Lake Pontchartrain and Vicinity, LA
Mississippi Valley	New Orleans	Larose to Golden Meadow, LA
Mississippi Valley	New Orleans	New Orleans to Venice, LA
Mississippi Valley	New Orleans	Southeast Louisiana, LA
Mississippi Valley	New Orleans	West Bank and Vicinity, New Orleans, LA
Mississippi Valley	Rock Island	Loves Park, IL
Mississippi Valley	St. Louis	Alton to Gale Organized Levee Districts, IL & MO
Mississippi Valley	St. Louis	East St. Louis, IL
Mississippi Valley	St. Louis	Meramec River Basin, Valley Park Levee, MO
Mississippi Valley	St. Louis	Monarch-Chesterfield, MO
Mississippi Valley	St. Louis	St. Louis Flood Protection, MO
Mississippi Valley	St. Louis	Ste. Genevieve, MO
Mississippi Valley	St. Louis	Wood River Levee, IL
Mississippi Valley	St. Paul	Crookston, MN
Mississippi Valley	St. Paul	Grand Forks, ND - East Grand Forks, MN
Mississippi Valley	St. Paul	Sheyenne River, ND

Division	District	Project Name and Location
North Atlantic	Baltimore	Lackawanna River, Olyphant, PA
North Atlantic	Baltimore	Washington, D.C. & Vicinity
North Atlantic	Baltimore	Wyoming Valley, PA
North Atlantic	New England	Muddy River, MA
North Atlantic	New York	Passaic River Preservation of Natural Storage Areas, NJ
North Atlantic	New York	Ramapo River at Oakland, NJ
North Atlantic	New York	Raritan River Basin, Green Brook Sub-Basin, NJ
North Atlantic	Philadelphia	Molly Ann's Brook at Haledon, Prospect Park and Paterson, NJ
Northwestern	Kansas City	Blue River Basin, Kansas City, MO
Northwestern	Kansas City	Blue River Channel, Kansas City, MO
Northwestern	Kansas City	Kansas Citys, MO & KS
Northwestern	Kansas City	Missouri River Levee System, IA, NE, KS, & MO
Northwestern	Kansas City	Turkey Creek Basin, KS & MO
Northwestern	Omaha	Antelope Creek, NE
Northwestern	Omaha	Big Sioux River, Sioux Falls, SD
Northwestern	Omaha	Missouri National Recreational River, NE & SD
Northwestern	Omaha	Perry Creek, IA
Northwestern	Omaha	Wood River, Grand Island, NE
Northwestern	Portland	Mount Saint Helens Sediment Control, WA
Pacific Ocean	Honolulu	Iao Stream Flood Control, Maui, HI
South Atlantic	Jacksonville	Arecibo River, PR
South Atlantic	Jacksonville	Cedar Hammock, Wares Creek, FL
South Atlantic	Jacksonville	Portugues and Bucana Rivers, PR
South Atlantic	Jacksonville	Rio de la Plata, PR
South Atlantic	Jacksonville	Rio Guanajibo, PR
South Atlantic	Jacksonville	Rio Puerto Nuevo, PR
South Atlantic	Savannah	Oates Creek, Richmond County, GA
South Atlantic	Wilmington	Roanoke River Upper Basin, Headwaters Area, VA
South Pacific	Albuquerque	Alamogordo, NM
South Pacific	Albuquerque	El Paso, TX
South Pacific	Albuquerque	Rio Grande Floodway, San Acacia to Bosque Del Apache, NM
South Pacific	Los Angeles	Los Angeles County Drainage Area, CA
South Pacific	Los Angeles	Santa Ana River Mainstem, CA
South Pacific	Los Angeles	Tropicana And Flamingo Washes, NV
South Pacific	Sacramento	American River Watershed (Common Features), CA
South Pacific	Sacramento	American River Watershed (Folsom Dam Modifications), CA
South Pacific	Sacramento	American River Watershed (Folsom Dam Raise), CA

Division	District	Project Name and Location
South Pacific	Sacramento	Guadalupe River, CA
South Pacific	Sacramento	Kaweah River, CA
South Pacific	Sacramento	Marysville/Yuba City Levee Reconstruction, CA
South Pacific	Sacramento	Mid-Valley Area Levee Reconstruction, CA
South Pacific	Sacramento	Napa River, CA
South Pacific	Sacramento	Sacramento River Bank Protection Project, CA
South Pacific	Sacramento	Sacramento River, Glenn-Colusa Irrigation District, CA
South Pacific	Sacramento	South Sacramento County Streams, CA
South Pacific	Sacramento	Stockton Metropolitan Flood Control Reimbursement, CA
South Pacific	Sacramento	Tule River, CA
South Pacific	Sacramento	Upper Sacramento Area Levee Reconstruction, CA
South Pacific	Sacramento	West Sacramento, CA
South Pacific	Sacramento	Yuba River Basin, CA
South Pacific	San Francisco	Petaluma River, CA
Southwestern	Ft. Worth	Johnson Creek, Upper Trinity Basin, Arlington, TX
Southwestern	Ft. Worth	Lower Colorado River Basin (Wharton/Onion), TX
Southwestern	Galveston	Brays Bayou, Houston, TX
Southwestern	Galveston	Sims Bayou, Houston, TX
Southwestern	Tulsa	Arkansas City, KS

Source: U.S. Army Corps of Engineers.

Appendix III: Descriptions of Eight Flood Control Projects Selected for Further Review

This appendix presents information provided by the U.S. Army Corps of Engineers on the eight flood control projects we selected for further review. Dollars have not been adjusted for inflation.

Brays Bayou, Houston, Texas

The Brays Bayou project is located in the metropolitan area of Houston, in Harris County, Texas. The project consists of channel improvements and storm water detention basins on upper Brays Bayou and a diversion channel in the lower portion of Brays Bayou. The nonfederal sponsor is the Harris County Flood Control District.

Brays Bayou is part of the Buffalo Bayou Watershed. The feasibility report for Buffalo Bayou and Tributaries was completed in 1988, and the Chief of Engineers' report was signed in 1990. The Chief's Report gave a total cost for the Buffalo Bayou and Tributaries project of $727,364,000 and also broke out the costs for each of the six tributary plans within the project. The estimated total project cost for Brays Bayou was $299,133,000. The Water Resources Development Act (WRDA) of 1990 authorized the Buffalo Bayou and Tributaries project for construction at a total cost of $727,364,000, but it did not specify an amount for Brays Bayou.

Funds to initiate preconstruction engineering and design were appropriated in fiscal year 1990. In 1995, the project was divided into two separable elements—a detention (upstream) element and a diversion (downstream) element. Subsequently, section 211(f) of WRDA 1996 authorized Brays Bayou as a demonstration project, which gave the nonfederal sponsor the lead in designing and constructing the project and let it be reimbursed for the federal share of the completed discrete segments approved by the Corps. In 1996, the nonfederal sponsor obtained approval from the Corps to do a general reevaluation of the diversion element in the lower portion of Brays Bayou because of regulatory restrictions on diversions to other watersheds. In the meantime, the sponsor proceeded with the detention element in the upstream portion. Funds to initiate construction were appropriated in fiscal year 1998. The project cooperation agreement for the design and construction of the detention element was signed in March 2000, and construction began in June 2000. The sponsor's general reevaluation report of an alternative to the diversion separable element was approved in April 2009. The project cooperation agreement was amended in March 2010 to combine the detention element and an alternative to the diversion element into one project. The total estimated project cost presented to Congress for fiscal year 2012 was $571,660,000.

Larose to Golden Meadow, Louisiana

The Larose to Golden Meadow project is located in Lafourche Parish, Louisiana, about 28 miles southwest of New Orleans and about 25 miles inland from the Gulf of Mexico along Bayou Lafourche. The project consists of a ring levee approximately 48 miles in length along both banks of Bayou Lafourche, enlargement of about 3 miles of an existing levee, and construction of two floodgates that will be used for navigation and hurricane protection purposes. The nonfederal sponsor is the South Lafourche Levee District.

Larose to Golden Meadow was originally called the Grand Isle and Vicinity project. The Chief's Report for Grand Isle and Vicinity estimated the total cost of Larose to Golden Meadow at $7,857,000.The Flood Control Act of 1965 authorized the Grand Isle and Vicinity project for construction at a federal cost of $5.5 million, but it did not specify the name Larose to Golden Meadow. Funds to initiate preconstruction engineering and design were appropriated in fiscal year 1967. The first general design memorandum was issued in 1972, and funds to initiate construction were appropriated in fiscal year 1972. A local cooperation agreement was provided by the South Lafourche Levee District and accepted on behalf of the United States in 1973, and construction started in 1976. The project did not have any modifications until WRDA 1999 authorized the conversion of the Leon Theriot floodgate into a lock, conditional on a determination that the conversion was technically feasible, environmentally acceptable, and economically justified; such a determination was documented in an evaluation report approved in 2005.

Section 7015 of WRDA 2007 required the Corps to do a 120-day study to see what modification would be required to provide the level of protection necessary to achieve the certification required for a 100-year level of flood protection in accordance with the National Flood Insurance Program. The study, which was completed in May 2009, estimated that the project was as much as 10 feet below the new 100-year level of risk reduction, and it would cost $681 million to bring the project to the authorized elevations described in the 1972 general design memorandum. A post-authorization study, which was started in May 2009, is to determine the cost to complete the project, including bringing the project into compliance with the new design criteria issued following Hurricane Katrina and other updated requirements. Since the Larose to Golden Meadow project was authorized before WRDA 1986, the Section 902 cost limit of WRDA 1986 does not apply. However, the project delivery team, under its own initiative, was conducting a 902 review as well. The total estimated project cost presented to Congress for fiscal year 2012 was $474 million.

Little Calumet River, Indiana

The Little Calumet River project is located in a primarily urban area in northwest Indiana, stretching westward to the Indiana-Illinois state line. The project includes the construction of levees, floodwalls, and closure and appurtenant structures. The nonfederal sponsor is the Little Calumet River Basin Development Commission.

A design study of the area was authorized by WRDA 1976. A general design memorandum for phase 1 was prepared in 1982 that included a number of preliminary designs to address flooding in the area. A feature design memorandum detailing the design recommended by the district engineer was completed in 1983. The July 1984 Chief's Report sent to Congress recommended the district engineer's design. However, WRDA 1986 authorized a design that was referenced in the 1982 Phase I General Design Memorandum, but not recommended in the Chief's Report, at a total project cost of $87.1 million. There was no feasibility study because the requirement to conduct a feasibility study started in the 1990s. A general design memorandum was signed in April 1989, the local cooperation agreement was signed in August 1990, funds to initiate construction were appropriated in fiscal year 1990, and construction started in September 1990.

In May 1999, Corps headquarters approved a post-authorization change report to extend the eastern end of the project area, and the project cooperation agreement was amended to include the scope change. In 2000, the district prepared a post-authorization change report to modify the project and increase the authorized project cost to $198 million, and the project cooperation agreement was amended again. Congress reauthorized the project at $198 million in the Energy and Water Development Appropriations Act of 2006. Another post-authorization change report to increase the authorized cost was prepared in March 2012. The report had been approved by the Assistant Secretary of the Army for Civil Works and was awaiting congressional action in September 2013. In January 2013, the project's cost to date was $248 million.

Monarch-Chesterfield, Missouri

The Monarch-Chesterfield project is located along the right bank of the Missouri River in the vicinity of Chesterfield, Missouri. The project consists of raising the existing levees on the Missouri River and Bonhomme Creek along with relief wells, a sheet pile cutoff, and berms to control underseepage. Other features include roadways, railroad and roadway closure structures, retaining walls, relocations, pumping stations with gravity structures, and environmental mitigation features. The nonfederal sponsor is the Monarch-Chesterfield Levee District.

The feasibility report, which was approved in December 2000, estimated the total project cost to be $58,090,000. The project was authorized for construction in WRDA 2000 at a total cost of $58,090,000, subject to the completion of a favorable Chief's Report by December 31, 2000. The Chief's Report was signed on December 29, 2000. Funds to initiate preconstruction engineering and design were appropriated in fiscal year 2001, and funds to initiate construction were appropriated in fiscal year 2004. The project cooperation agreement was signed in February 2008, and construction began the same year. The total estimated project cost presented to Congress for fiscal year 2012 was $68,688,000.

Muddy River, Massachusetts

The Muddy River is a 3.5 mile urban waterway located in eastern Massachusetts in the communities of Boston, Brookline and Newton. The flood control portion of the project primarily involves dredging sediment to increase conveyance, removal and replacement of undersized culverts, and restoration of streambanks. It also has an environmental component. Phase I involves installing larger box culverts, day-lighting two sections of the river, and modifying a bridge and culvert headwall for flood risk management. Phase II involves dredging of the river for both flood risk management and ecosystem restoration. The nonfederal sponsors are the Commonwealth of Massachusetts, the city of Boston, and the town of Brookline.

After severe flooding in 1996, the city of Boston, the town of Brookline, the Commonwealth of Massachusetts, the Federal Emergency Management Agency, and nonprofit community groups developed a comprehensive plan to identify and address issues affecting the river, which was issued in January 1999. Local interests went to their congressional delegation and convinced them of the need for a project. WRDA 1999 directed the Corps to evaluate the study prepared by local interests to determine whether the plans were in the federal interest, among other things, and report back to Congress no later than June 30, 2000. The Corp's draft evaluation report, dated June 2000, determined that the plan met some of the requirements of a federal project. However, continued Corps involvement would require preparation of a decision document that evaluated alternatives and met other requirements. Based on the Corps' draft evaluation report, the project was authorized for construction in WRDA 2000. Once the project was authorized, the Corps had to prepare the required decision documents. The final report with an estimated total project cost of $62,830,000 was submitted to Corps headquarters for approval in September 2003. Corps headquarters prepared a Chief's Report, which it forwarded to the Assistant Secretary

of the Army for Civil Works in December 2003. In July 2004, the Assistant Secretary of the Army for Civil Works expressed support for the flood control component of the project but determined that the ecosystem restoration elements had a unit cost that was too high to support as a federally implementable plan and therefore were not justified. However, the Assistant Secretary of the Army for Civil Works later agreed that the Corps would build the environmental restoration portion of the project if Congress provided funding for that purpose.

Funds to initiate preconstruction engineering and design were appropriated in fiscal year 2001. Funds to initiate construction were first appropriated in fiscal year 2003, and the project partnership agreement was signed in 2011. The first construction contract was awarded on August 10, 2012. However, there was a bid protest, so construction did not begin until 2013. The total estimated project cost presented to Congress for fiscal year 2012 was $79,800,000.

Napa River, California

The Napa River project is located in the city and county of Napa, California. The Napa River drainage basin is just north of San Pablo Bay and approximately 40 miles northeast of San Francisco, California. The project consists of channel modifications to provide the project area with 100-year level of flood protection from Napa River and Napa Creek. Channel modifications include overbank excavation, vertical walls, floodwalls, levees, bridges, pumping stations, and flowage easements. The project also includes recreation trails and major ecosystem restoration. The nonfederal sponsor is the Napa County Flood Control and Water Conservation District.

The Napa River Flood Control Project was authorized by the Flood Control Act of 1965 substantially in accordance with the Chief's Report at an estimated cost of $14,950,000. The project received an additional authorization in WRDA 1976 to modify the scope of the project to include Napa Creek. The project has no 902 limit because it was authorized before WRDA 1986.

Funds to resume preconstruction engineering and design were appropriated in fiscal year 1989. A general reevaluation report was prepared in 1995. The Final Supplemental General Design Memorandum, dated October 1998, was approved May 1999. Funds to initiate construction were appropriated in fiscal year 2000, the project cooperation agreement was signed in February 2000, and construction began in December 2000. A Section 215 agreement for construction of a

portion of the project by the nonfederal sponsor was signed in January 2002, and the sponsor completed construction in fiscal year 2002. A limited reevaluation report, which was approved in August 2005, determined that, based on the benefit-cost ratio, the project still had a federal interest. The project cooperation agreement was amended in 2007, which provided the acceleration of the sponsor's required cash contribution to the government. The total estimated project cost presented to Congress for fiscal year 2010—the last year the project was budgeted for construction—was $402,770,000.

Roanoke River Upper Basin, Virginia

The Roanoke River Upper Basin project is located on the Roanoke River in the city of Roanoke, Virginia. The project includes about 6.2 miles of channel widening, flood proofing at two locations, training walls to prevent floodwater intrusion into low areas along the river, and a flood warning system. Recreation facilities consist of a 9.5-mile recreation trail along the project reach, trail access, and parking areas. The nonfederal sponsor is the city of Roanoke.

The Chief's Report was finalized in 1985, and the project was authorized by WRDA 1986 at a total project cost of $21 million. Funds to initiate preconstruction engineering and design were appropriated in fiscal year 1986. A general design memorandum, dated May 1989 and approved in January 1990, was the basis for design and construction of the project. The Energy and Water Development Appropriations Act, 1990, reauthorized the project for $29 million. The project started receiving construction funds in 1990, and a local cooperation agreement was signed in June 1990. A supplement to the local cooperation agreement was signed in January 1993 to reimburse the sponsor for flood proofing the hospital. The Energy and Water Development Appropriations Act, 2004, increased the authorized total cost to $61.7 million. In 2005, the first construction contract was awarded for work on the flood control features. The project was physically completed in October 2011. The Roanoke Logperch, which is located in the project area, was listed as an endangered species in 1989 and will be monitored until at least 2015. Once the monitoring is completed, the project will be fiscally closed out.

Turkey Creek Basin, Kansas and Missouri

Turkey Creek Basin drains Johnson and Wyandotte Counties in Kansas, as well as a portion of Kansas City, Missouri. Turkey Creek parallels Interstate Highway 35 for much of its length and flows through a tunnel into the Kansas River approximately 3 miles upstream of the Missouri River. The project consists of approximately 10,000 feet of urban channel

modification, a levee section, the raising of two railroad bridges, 12.7 acres of riparian planting, and four large drainage interceptor pipelines. The nonfederal sponsors are the city of Kansas City, Missouri, and the Unified Government of Wyandotte County and Kansas City, Kansas.

Major flooding occurred in the Turkey Creek Basin in 1977 and 1993. The feasibility study was completed in December 1998, and the project received its first funding for preconstruction engineering and design in 1998. The Chief's Report was finalized in 1999, and the project was authorized by WRDA 1999 at a total project cost of $42,875,000. Major flooding occurred again in 1998, so the Corps conducted a general reevaluation from 1999 to 2003 to determine whether any modifications needed to be made based on information from the 1998 flood. Based on the findings of the general reevaluation, the project expanded significantly, and costs increased to $73 million. The Consolidated Appropriations Resolution, 2003, modified the project to authorize construction substantially in accordance with recommendations in a final Chief's Report if a favorable report was completed by December 31, 2003, at a total project cost of $73,380,000. The act also gave the Corps the authority to give the sponsor credit for its share of the costs of construction work completed before the project cooperation agreement was signed if the work was integral to the project. A final Chief's Report was completed in December 2003. Preconstruction engineering and design was completed in September 2004. Funds to initiate construction were first appropriated in fiscal year 2004, and a project cooperation agreement was signed in July 2006 following completion of tunnel work by the sponsor. In 2009, the Corps finished the tunnel construction started by the sponsor. The total estimated project cost presented to Congress for fiscal year 2012 was $108 million.

Appendix IV: Comments from the Department of Defense

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

OCT 30 2013

Ms. Anne-Marie Fennell
Director
Natural Resources and Environment
U.S. Government Accountability Office
441 G Street, NW
Washington, DC 20548

Dear Ms. Fennell:

This is the Department of Defense (DoD) response to the GAO Draft Report, GAO-14-35, "ARMY CORPS OF ENGINEERS: Cost Increases in Flood Control Projects and Improving Communication with Nonfederal Sponsors," dated October 2013 (GAO Code 361407).

DoD concurs with the recommendation of the GAO report, and will be taking steps to address the recommendation. Specifics regarding this initiative are enclosed. DoD appreciates this opportunity to address the GAO recommendation for improving communication between the Corps of Engineers and its nonfederal sponsors.

Very truly yours,

jo-ellen darcy

Jo-Ellen Darcy
Assistant Secretary of the Army
(Civil Works)

Enclosure

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GAO DRAFT REPORT DATED OCTOBER 2013
GAO-13-35 (GAO CODE 361407)

"COST INCREASES IN FLOOD CONTROL PROJECTS AND IMPROVING COMMUNICATION WITH NONFEDERAL SPONSORS"

DEPARTMENT OF DEFENSE COMMENTS TO THE GAO RECOMMENDATION

RECOMMENDATION 1: To improve the communication between the Corps and nonfederal sponsors of flood control projects, we recommend that the Secretary of the Defense direct the Chief of Engineers and Commanding General of the U.S. Army Corps of Engineers take steps to ensure that flood control project delivery teams comply with agency guidance to develop communication plans for flood control projects.

DoD RESPONSE: Concur. The U.S. Army Corps of Engineers (USACE) recognizes the importance of planning and executing communications for flood control projects. Effective communications is integrated into our policies, regulations, internal controls, and project management business processes. The framework and requirements within our business processes have already been established for effective communications. USACE will re-evaluate the effectiveness of its policies, regulations, and project management business processes seeking opportunities to improve them. In addition, the USACE will ensure each project is compliant with its primary regulation, ER 5-1-11 (USACE Business Process) through the USACE Managers' Internal Control Program, which is part of the Annual Statement of Assurance requirement to the Congress. ER 5-1-11 outlines five operating principles governing all work performed by USACE:

- Plan for success and keep commitments;
- Measure quality with the goals and expectations of the customer in mind;
- Build effective communications into all activities and processes;
- Use best practices and seek continual improvement; and
- Use corporate automated information systems consistently and accurately.

Appendix V: GAO Contact and Staff Acknowledgments

GAO Contact

Anne-Marie Fennell, (202) 512-3841 or fennella@gao.gov.

Staff Acknowledgments

In addition to the individual named above, Vondalee R. Hunt (Assistant Director), Elizabeth Beardsley, Heather Dowey, Cindy Gilbert, Susan Malone, and Kyle Stetler made key contributions to this report. Important contributions were also made by Cheryl Arvidson, Dan Royer, and Kiki Theodoropoulos.