United States Government Accountability Office

Report to Congressional Requesters

August 2017

ARMY CORPS OF ENGINEERS

Better Data Needed on Water Storage Pricing

GAO-17-500

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GAO Highlights

Highlights of GAO-17-500, a report to congressional requesters

Why GAO Did This Study

The Corps is to implement the water storage provisions of the Water Supply Act of 1958 at Corps' projects, such as reservoirs, across the United States. Under the act, the Corps enters into agreements with M&I water users, such as local water utilities, for storage space in the projects. As part of these agreements, the Corps includes the terms of repayment to cover the cost to construct, operate, and maintain the project.

GAO was asked to review the Corps' process for setting M&I water storage agreement prices. Among other objectives, this report examines (1) what is known about the variability of these prices and (2) M&I water users' and stakeholders' views on water storage prices and how the Corps sets M&I water storage prices. GAO reviewed the M&I water storage agreement data stored in OMBIL and assessed the reliability of the data, in part, by comparing information in agreements with data in OMBIL and interviewed Corps officials in headquarters and the Kansas City, Savannah, and Tulsa districts and a nongeneralizable sample of 26 M&I water users and 14 stakeholders such as industry groups, all selected for such factors as number of storage agreements.

What GAO Recommends

GAO recommends that the Corps systematically review and correct its data on M&I water storage agreements and develop policy and guidance for conducting such reviews; and collect and analyze data on the time it takes to complete reallocation agreements. The agency concurred with the recommendations.

View GAO-17-500. For more information, contact Anne-Marie Fennell at (202) 512-3841 or fennella@gao.gov.

What GAO Found

Based on GAO's review of the U.S. Army Corps of Engineers' (Corps) municipal and industrial (M&I) water storage agreement data stored in the Operations and Maintenance Business Information Link (OMBIL) database and discussions with agency officials, GAO could not determine the extent to which storage prices varied because Corps' data were not sufficiently reliable for such an analysis. Specifically, some data contained errors or were missing, and inconsistencies existed in how some data were recorded in OMBIL. Corps officials said that they do not systematically review the data, such as regularly tracing data in OMBIL back to the originating agreement to ensure the data are accurate. Instead, Corps officials said they conducted a limited quality control review of the M&I water storage agreement data in OMBIL but have not resolved all the errors they identified to help ensure complete and accurate information, as called for by federal standards for internal control. Without systematically reviewing and correcting the data in OMBIL, the Corps and users of the information may not have access to reliable M&I water storage agreement data. Corps officials also said they do not currently have plans to systematically review the M&I water storage agreement data in OMBIL because the agency does not have a policy and implementing guidance requiring review of the data, which is inconsistent with federal internal control standards. Without developing a policy and implementing guidance on how staff should systematically review and correct M&I water storage agreement data, the Corps will continue to have issues with the reliability of the data. While GAO could not determine the extent of variability in prices, Corps officials and M&I water users and stakeholders said that M&I water storage agreement prices vary. Agency officials identified factors that may contribute to the variation, including a project's original construction costs and the year the M&I water storage agreement was signed, given that inflation may increase prices charged for storage.

Many M&I water users GAO interviewed were generally satisfied with the Corps' M&I water storage pricing process. However, many M&I water users and stakeholders also highlighted concerns with their water storage agreements, primarily the length of time it took to complete the process for establishing agreements that reassign storage at existing projects from one use, such as hydropower generation, to use for M&I water supply. For example, one M&I water user GAO interviewed said it took the Corps 16 years to finalize its study for the water user's storage request and in that time the community faced a drought that jeopardized the ability to meet water storage needs of a local power plant. Corps officials could not provide estimates of the time it takes to complete the process because the agency does not systematically track this information. Under federal standards for internal controls, management should design control activities to achieve objectives and respond to risks. Such activities include promptly recording all transactions to maintain their relevance and value to management in controlling operations and making decisions. Without collecting and analyzing data on the length of time it takes to complete the process, the Corps does not have the information to identify areas that may hinder its ability to complete the water storage pricing process in a timely manner.

Contents

Abbreviations

Corps	U.S. Army Corps of Engineers
M&I	municipal and industrial
O&M	operation and maintenance
OMBIL	Operations and Maintenance Business Information Link

U.S. GOVERNMENT ACCOUNTABILITY OFFICE
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August 18, 2017

The Honorable Bill Shuster
Chairman
The Honorable Peter DeFazio
Ranking Member
Committee on Transportation and Infrastructure
House of Representatives

The Honorable James M. Inhofe
United States Senate

The Honorable Jim Bridenstine
House of Representatives

The Honorable Markwayne Mullin
House of Representatives

The U.S. Army Corps of Engineers (Corps) is the world's largest public engineering agency and manages hundreds of water storage projects, such as reservoirs, across the United States through its civil works program.[1] These projects serve a variety of purposes, including storage for flood control, hydropower, and irrigation. In addition, Corps projects store millions of acre-feet of water for municipal and industrial (M&I) purposes,[2] which include water for the operation of municipal and community water systems for use in households, commercial operations, and public supplies. M&I water may also be used for industrial processes, such as mining operations and power generation.

According to a Corps document,[3] in the early 1950s, the growing water supply problems of the United States led the Chief of Engineers to urge that all Corps reservoirs constructed for river control include water supply

[1]The Corps' military program provides, among other things, engineering and construction services to other U.S. government agencies and to foreign governments. This report focuses only on the Corps' civil works program.

[2]An "acre-foot" of water is the volume of water required to cover 1 acre of land to a depth of 1 foot. An acre-foot is equivalent to approximately 326,000 gallons.

[3]U.S. Army Corps of Engineers, *Water Supply Handbook: A Handbook on Water Supply Planning and Resource Management* (Institute for Water Resources, December 1998).

storage. Subsequently, Congress passed the Water Supply Act of 1958, which states that water supply development is primarily a non-federal responsibility, but the federal government should cooperate with states and local interests in developing water supplies in connection with federal water projects.[4] This act authorized the Corps to include M&I water supply for present and future demand at Corps reservoir projects. The Corps views the Water Supply Act of 1958 as the primary vehicle for its involvement in water supply storage.

The Corps is responsible for implementing the water storage provisions of the Water Supply Act of 1958, as amended, at Corps' projects. Under the act, the Corps enters into agreements with M&I water users, such as states, local water utilities, or municipalities, for water storage space in the Corps' projects. These agreements may be either (1) originally authorized agreements for water supply that was included in storage plans prior to the construction of the reservoir; or (2) reallocation agreements, where storage at existing projects is reassigned from one use, such as hydropower generation, to use for M&I water supply.

The Corps neither acquires nor secures the rights to the water, nor does the Corps play a substantial role in the delivery of stored water to users.[5] As part of these M&I water storage agreements with water users, the Corps includes the terms of repayment to cover the cost to construct, operate, and maintain the project. Specifically, M&I water users pay for the total expenditures to physically build a project including the cost of lands, relocations, engineering, design, administration, and supervision (i.e., first costs) plus interest, if amortized and repaid through annual payments.[6] Water users also pay for a portion of the total annual operation and maintenance (O&M) costs for the project.[7]

[4]Pub. L. No. 85-500, Title III, § 301, 72 Stat. 319 (1958), codified as amended at 43 U.S.C. § 390b.

[5]Water users generally pay for construction specific to the water user, including the cost to construct a water supply conduit included as part of a dam outlet as well as infrastructure to convey water from the Corps' project to the water user.

[6]Amortization is the economic method of repaying a debt or recovering the wealth invested in a project over a determined period of time.

[7]O&M costs include the day-to-day expenses to operate and maintain the project, such as maintenance staff salaries or concrete repairs.

According to a Corps' report,[8] as of December 2014, the agency's water storage database contained information on approximately 340 separate agreements, including almost 140 reallocation agreements, for water stored in approximately 140 reservoirs managed by the Corps in 25 states. Since the 1960s, the construction of new projects has slowed markedly and the Corps has increasingly met the demands for increased M&I storage through reallocation agreements, where the Corps reassigns water storage from one use to use for M&I water supply. Of the almost 140 reallocation agreements currently managed by the Corps, just over 100 (approximately 75 percent) have been signed since 1990. Increased demand for storage to help M&I water users meet the water supply needs of their customers, combined with reduced water availability stemming from recent droughts, among other factors, has increased interest in how the Corps sets prices for M&I water storage.

We were asked to review the Corps' process for setting M&I water storage prices. This report examines (1) how the Corps sets M&I water storage prices; (2) what is known about the variability, if any, of those prices; and (3) M&I water users' and stakeholders' views on water storage prices and how the Corps sets M&I water storage prices.

To examine how the Corps sets M&I water storage prices, we reviewed relevant laws, such as the Water Supply Act of 1958, and Corps' policies and guidance on water storage. We interviewed Corps' headquarters officials knowledgeable about Corps' M&I water supply policies, as well as agency officials in three Corps' districts (Kansas City, Savannah, and Tulsa) to understand how the Corps calculates and considers the effects of water storage at Corps projects when setting storage prices. We selected these districts based on a number of criteria, including data on differences in the total M&I storage space at Corps' projects in a district, number of M&I agreements in a district, and method used to set storage prices in reallocation agreements. These data were obtained from the

[8]U.S. Army Corps of Engineers, *2014 Municipal, Industrial, and Irrigation Water Supply Database Report* (Institute for Water Resources, August 2015). The Corps periodically publishes information about its M&I water storage agreements in these M&I Water Supply Database reports, which date back to 1998. The Corps published an updated M&I Water Supply Database report in June 2017. The June 2017 report was not available at the time of our review; therefore, we refer to the August 2015 report as the most recent M&I Water Supply Database report available at the time of our review that presents data from the Corps' Operations and Maintenance Business Information Link (OMBIL). While we identified data reliability issues with OMBIL data as described in our report, we present high-level information about the Corps' water storage agreements for context.

Corps' primary water storage database—the Operations and Maintenance Business Information Link (OMBIL)—which maintains storage data on Corps' projects.

To examine what is known about the variability in the prices the Corps charges for M&I water storage, we assessed the reliability of OMBIL data and determined that they were not sufficiently reliable for analyzing variability in prices. We made this determination after identifying a number of concerns, such as errors in the data, based on our review of the data and interviews with Corps officials. We discuss these limitations in our report. For example, we used the OMBIL data to compare a random sample of M&I water storage agreements to the corresponding data maintained in the database to determine whether the OMBIL data match the information in the agreements. We also interviewed Corps officials in headquarters and the three districts to discuss the reliability of the OMBIL data and M&I Water Supply Database reports. OMBIL has separate modules for other Corps purposes, such as navigation, but we only reviewed the data in the water supply module. While we determined that the OMBIL data were not sufficiently reliable for analyzing variability in prices, Corps officials said that the data are the best available on agreements. Therefore, we present high-level data from the most recent M&I Water Supply Database report available at the time of our review to provide context for the M&I water storage agreements, such as the number of M&I water storage agreements the Corps has with water users. In addition, we used data from the M&I Water Supply Database report, which presents data from OMBIL, to select the three Corps districts, as previously discussed. Finally, we also interviewed Corps officials at headquarters and the district offices regarding factors that may affect the price of M&I water storage across agreements.

To determine M&I water users' and stakeholders' views on water storage prices and how the Corps sets M&I water storage prices, we interviewed officials and representatives from a nongeneralizable sample of 26 M&I water users in the three Corps districts. For the purposes of our report, "M&I water users" included cities, water districts, water authorities, and cooperatives with M&I water storage agreements with the Corps in the three selected districts. To determine our sample of M&I water users, we analyzed OMBIL data on the number of active M&I water storage agreements in the three Corps' districts. We also interviewed a nongeneralizable sample of 14 water stakeholders. They included officials from nonfederal entities that may have M&I water storage agreements with the Corps but were not selected as part of our sample of agreement holders in the three selected Corps districts, as well as industry groups

and representatives of the hydropower industry who operate hydropower plants at some Corps projects. While samples are nongeneralizable to all water users and stakeholders, they provide illustrative examples and insights into how, if at all, the views of water users and stakeholders may differ in various locations. We used the categories shown in table 1 to quantify M&I water users' and stakeholders' responses.

Table 1: Categories for Quantifying Water Users' and Stakeholders' Responses

Response category	Water users	Water stakeholders	Both water users and stakeholders
Few	2–5 out of 26	2–3 out of 14	4–8 out of 40
Some	6–10 out of 26	4–6 out of 14	9–16 out of 40
Many	11–26 out of 26	7–14 out of 14	17–40 out of 40

Source: GAO analysis. | GAO-17-500

We then conducted a content analysis of the water users' and stakeholders' responses to identify common themes. The coding of responses was independently verified by a second analyst. We also interviewed Corps officials from the three districts to learn how the Corps communicates with M&I water users and stakeholders.

We conducted this performance audit from July 2015 through August 2017 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

Located within the Department of Defense, the Corps has both military and civilian responsibilities. The Corps' civil works program, which is responsible for water resources projects, is organized into three tiers: a national headquarters in Washington, D.C.; eight regional divisions that were generally established according to watershed boundaries; and 38 districts nationwide.

Corps headquarters primarily develops the policies and guidance that the agency's divisions and districts carry out as part of their oversight responsibilities of the water projects under the Corps' purview. 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 divisions. Corps' districts, also commanded by military officers, are responsible for planning, engineering, constructing, and managing water-resources infrastructure projects in their districts.

The Corps also has a number of centers of expertise, with staff that provide specialized knowledge and skills for fulfilling the Corps' responsibilities.[9] One center of expertise is the Hydroelectric Design Center, located in the Corps' Portland district, which provides hydroelectric and large pumping plant engineering services. Within the Hydroelectric Design Center is the Hydropower Analysis Center, which conducts analyses of hydropower projects and economic benefit evaluations for existing and new hydropower projects for all of the Corps' power plant installations.

Corps' Role in M&I Water Storage

The Corps enters into agreements with M&I water users, such as states or local water utilities, for water storage within Corps-managed projects, such as reservoirs or dams.[10] According to a Corps report,[11] as of

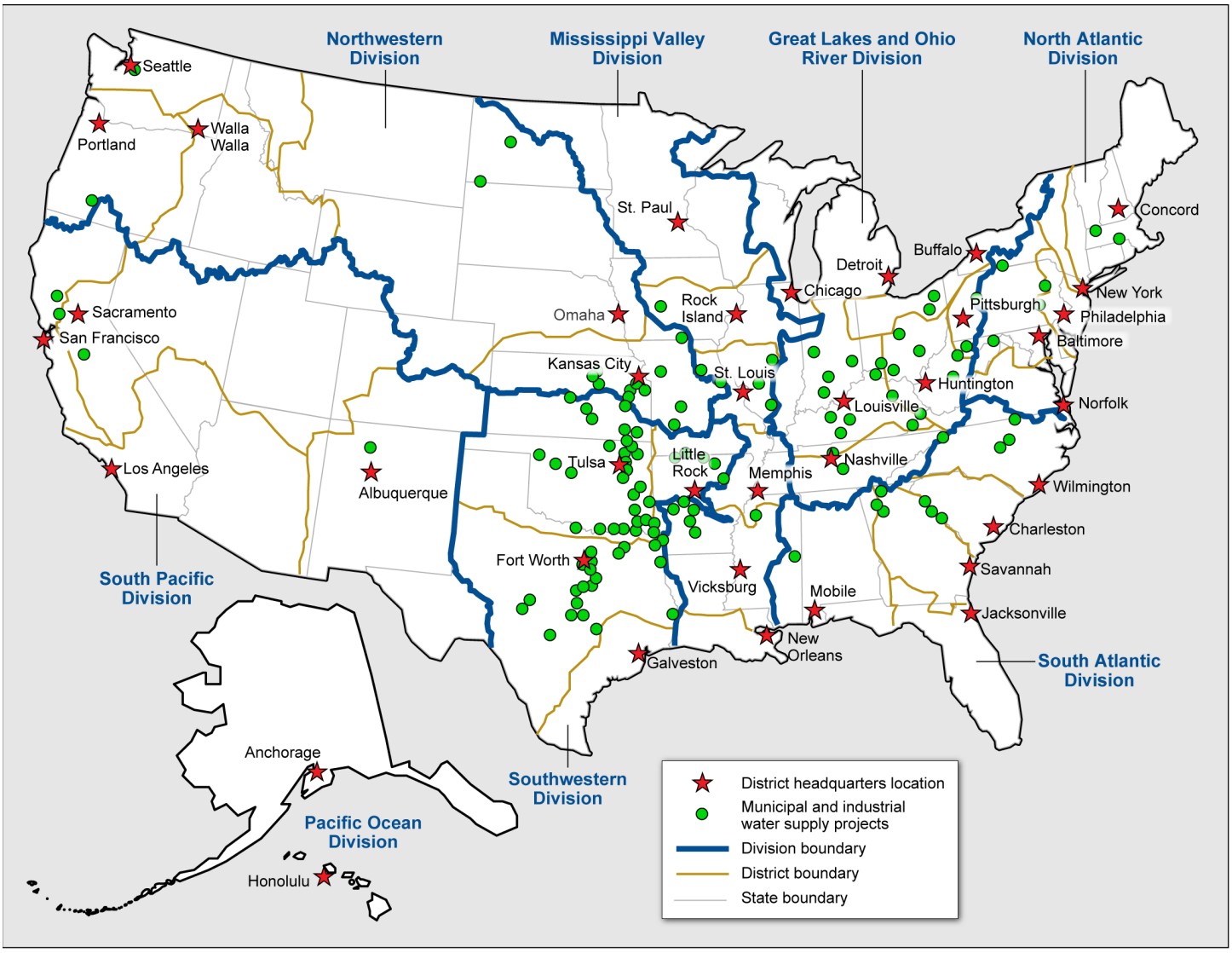
[9] For a full list of the Corps' centers of expertise, see http://www.usace.army.mil/about/centersofexpertise.aspx.

[10]The Department of the Interior's Bureau of Reclamation also constructs and operates federal projects. This report focuses specifically on Corps projects.

[11]U.S. Army Corps of Engineers, *2014 Municipal, Industrial, and Irrigation Water Supply Database Report* (Institute for Water Resources, August 2015).

December 2014, the majority of M&I water storage is concentrated in the Corps' Southwestern division, which contains almost half of the Corps' projects with M&I water supply storage, and over two-thirds of Corps M&I storage by volume. The next highest concentration of projects with M&I storage is in the Corps' Great Lakes and Ohio River division, with approximately one-fifth of Corps projects and just over 5 percent of storage volume (see fig. 1).

Figure 1: Location of U.S. Army Corps of Engineers' Projects with Municipal and Industrial Water Storage

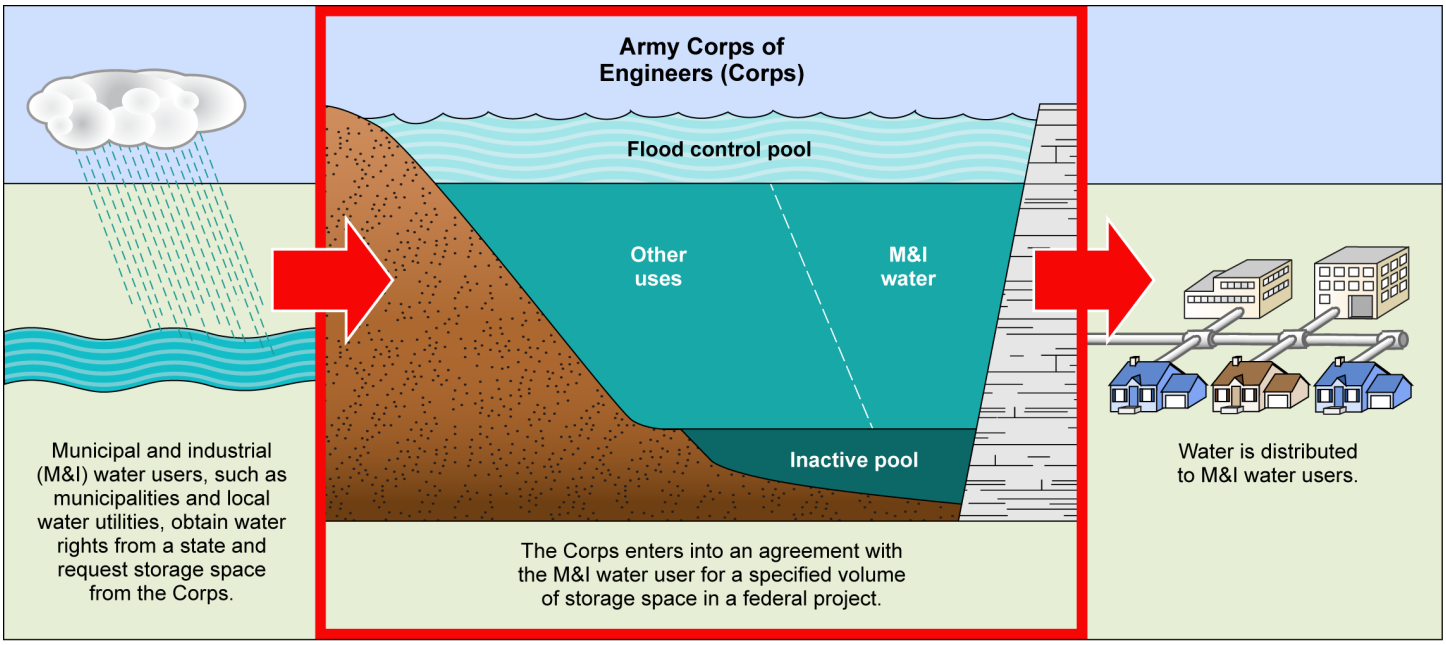


Sources: GAO analysis of U.S. Army Corps of Engineers data; Map Resources (map). | GAO-17-500

Note: The U.S. Army Corps of Engineers civil works program, which is responsible for water resources projects, is organized into three tiers: a national headquarters in Washington, D.C.; eight regional divisions; and 38 districts nationwide. Alaska and Hawaii do not have U.S. Army Corps of Engineers projects with municipal and industrial water storage.

The Corps provides M&I water storage but does not have a role in acquiring or securing the rights for water that users store at Corps' projects. Water users must secure the necessary water rights.[12] The Corps also does not have a substantial role in the distribution of stored water, which is generally the responsibility of water users.[13] Figure 2 shows the key stages, including the Corps' role, in the M&I water storage process.

Figure 2: Key Stages in Municipal and Industrial (M&I) Water Storage



Source: GAO analysis of Army Corps of Engineers information. | GAO-17-500

Notes: Depending on the particular purposes of a project, water may also be stored in Corps projects for other purposes, such as hydroelectric power generation, recreation, ecosystem restoration, and navigation. The inactive pool is the lowest storage area. Water in the inactive pool would only be used during extreme droughts or emergencies.

[12]Water rights are a form of real property, protected by state and federal laws. Depending on the legal system used in the locale, water rights may originate in ownership of riparian lands (i.e., lands that occur along waterways and water bodies) or be acquired by statutorily recognized methods of appropriation.

[13]Generally, the Corps does not have a role in the distribution of water stored at its projects. In some instances, however, the Corps may fund and construct conduits for distribution, if directed by Congress.

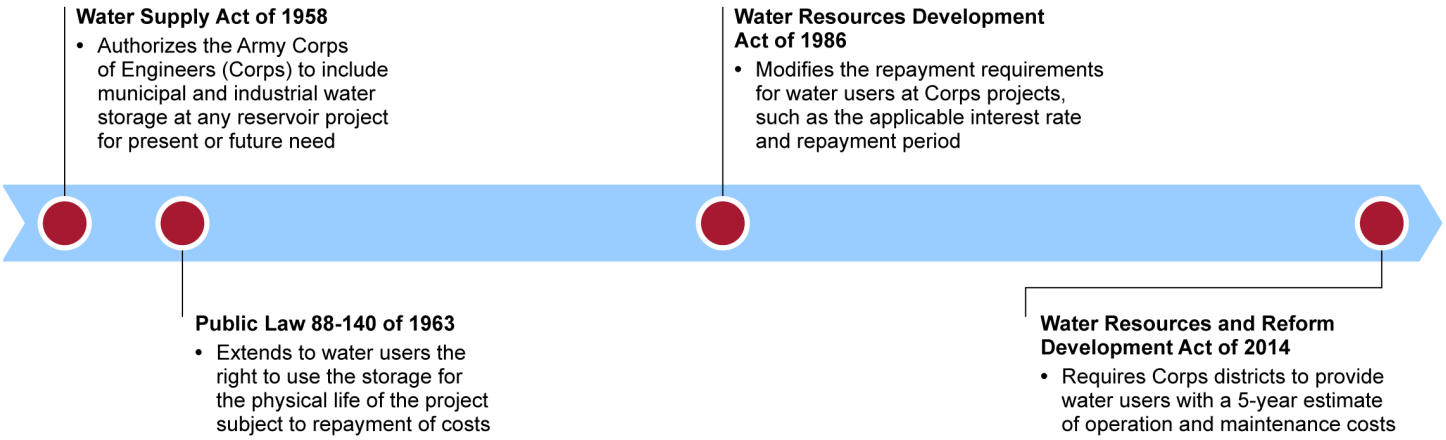
The Water Supply Act of 1958 authorizes the Corps to provide M&I water storage at federal projects owned and operated by the Corps to water users on a reimbursable basis. Under this act, a water user is to reimburse the Corps for the costs associated with the user's share of the storage costs.[14] Water users do so by entering into "repayment" agreements with the Corps. The Water Resources Development Act of 1986 amended the Water Supply Act of 1958 by changing the repayment period for water storage agreements from 50 years, as established in the 1958 act, to 30 years.[15] It also provided that the terms of repayment for M&I water storage agreements signed after 1986 be recalculated every 5 years, using an interest rate current at the time of recalculation, and required that O&M costs be reimbursed annually.[16] See figure 3 for a timeline of key statutes that establish the Corps' water storage authorities.

[14]The share of the user's cost of storage is the same ratio as the share of the user's storage space to the total water supply storage space. The cost of authorized M&I water supply storage in new and existing projects is the total construction cost allocated to the water supply storage space. This cost includes (as appropriate) interest and the cost of past expenditures for items such as repair, replacement, rehabilitation, and reconstruction. The cost also includes the user's share of operation and maintenance expenses allocated to water supply.

[15]Pub. L. No. 99-662, § 932, 100 Stat. 4196 (1986).

[16]The Water Resources Development Act of 1986 states that the interest rate used to repay the cost of storage over time shall be "determined by the Secretary of the Treasury, taking into consideration the average market yields on outstanding marketable obligations of the United States, with remaining periods to maturity comparable to the reimbursement period, during the month preceding the fiscal year in which the costs for the construction of the project are first incurred (or when a recalculation is made), plus a premium of one-eighth of 1 percentage point for transaction costs."

Figure 3. Key U.S. Army Corps of Engineers Municipal and Industrial Water Storage Authorities



Sources: GAO analysis of federal laws and U.S. Army Corps of Engineers information. | GAO-17-500

Corps' Process for Establishing M&I Water Storage Agreements

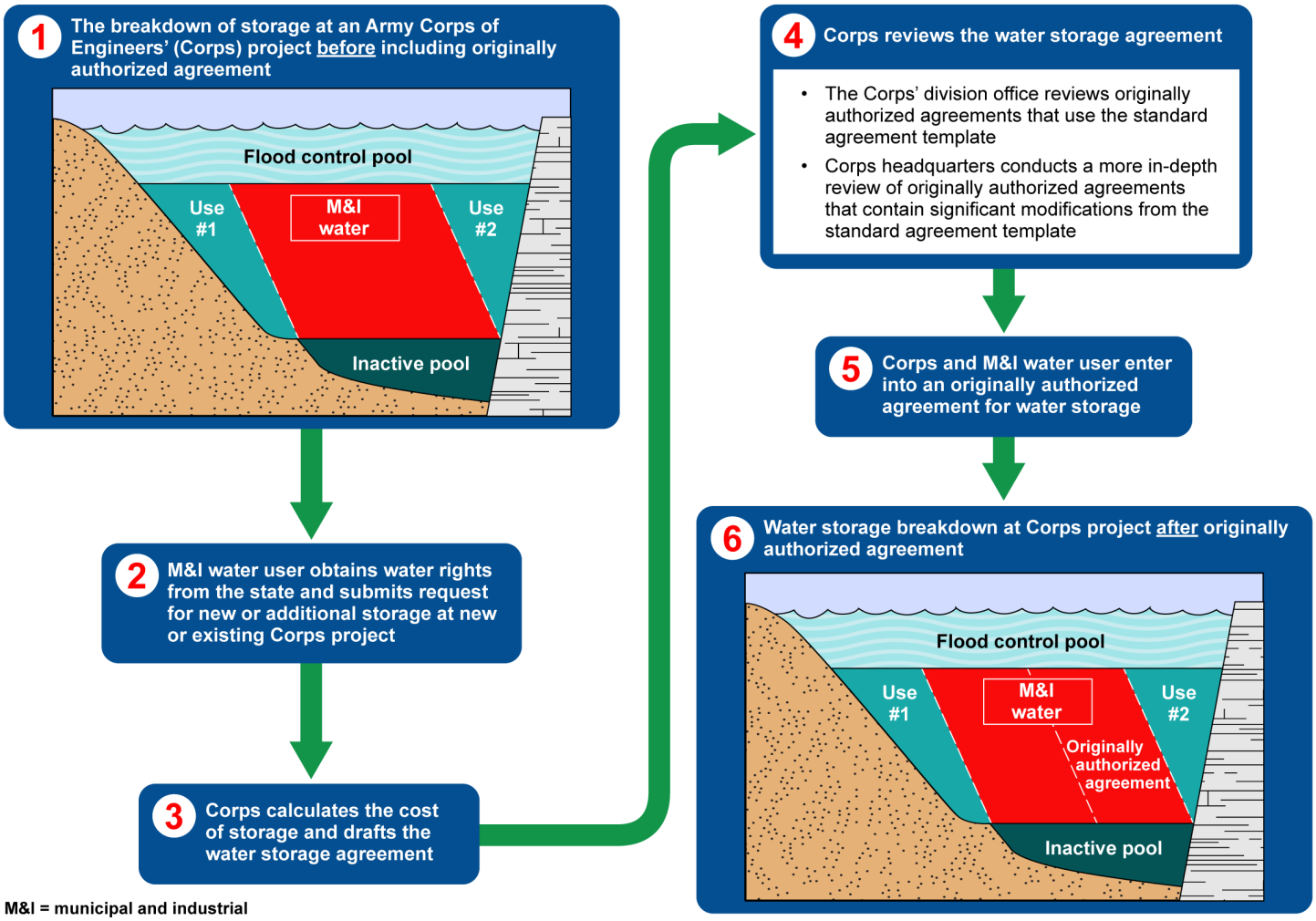
Under the Water Supply Act of 1958, water users may enter into one of two types of M&I water storage agreements: originally authorized and reallocation. According to Corps officials, under both types of agreements, water users approach the Corps to request a water storage agreement and are to demonstrate that they have secured the necessary water rights under state law.[17]

Under the act, the Corps may enter into originally authorized agreements for water supply that were included in storage plans prior to the construction of the project, pursuant to specific congressional authorization. Since the 1990s, however, construction of new projects has slowed significantly, resulting in fewer originally authorized agreements. According to Corps officials, the last projects with originally authorized M&I water storage were constructed in 1991. As shown in figure 4, to initiate an originally authorized water storage agreement, an M&I water user typically approaches the Corps. The Corps district calculates the cost of storage and drafts a water storage agreement. The Corps has a

[17]The Water Supply Act of 1958 states that it is the policy of the Congress to recognize the primary responsibilities of the states and local interests in developing water supplies for domestic, municipal, industrial, and other purposes and that the federal government should participate and cooperate with states and local interests in developing such water supplies in connection with the construction, maintenance, and operation of federal navigation, flood control, irrigation, or multiple purpose projects. 43 U.S.C. § 390b(a).

standard agreement template it generally uses for originally authorized water storage agreements. The Corps' division reviews the water storage agreement when it uses the standard agreement template. In cases where the water storage agreement exceeds 1,000 acre-feet of storage space or contains significant modifications from the standard template, review and approval by Corps headquarters officials is needed.

Figure 4. The U.S. Army Corps of Engineers' Process for Issuing Originally Authorized Municipal and Industrial Water Storage Agreements



M&I = municipal and industrial

Source: GAO analysis of U.S. Army Corps of Engineers policy. | GAO-17-500

Notes: The water user is responsible for obtaining water rights under state law. The Corps does not provide the water rights.

The Corps manages water storage projects that have a variety of uses such as storage for flood control, hydropower, and irrigation. For illustrative purposes, the figure depicts such uses as use #1 and use #2. In addition, Corps projects store millions of acre-feet of water for M&I purposes.

Originally authorized M&I water storage agreements are agreements for water supply that were included in storage plans prior to the construction of the reservoir.

The inactive pool is the lowest storage area. Water in the inactive pool would only be used during extreme droughts or emergencies.

Dashed lines are not physical separations. The lines are used to indicate increases and decreases in the storage volume of existing uses within the reservoir as a result of an originally authorized M&I water storage agreement.

Under the Water Supply Act of 1958, the Corps also may reallocate or reassign water storage at an existing project (e.g., reservoir) from one use to another, such as reallocating storage for hydropower generation to M&I water supply.[18] The act prohibits the Corps from reallocating storage in a manner that would seriously affect the project purposes or that would involve major structural or operational changes without congressional approval. Since the mid-1980s, the Corps has increasingly entered into reallocation agreements to provide M&I water storage. According to a Corps report published in 2015,[19] the Corps entered into over 30 reallocation agreements from the 1950s through the 1980s and over 130 originally authorized agreements. From 1990 through December 2014, the Corps entered into approximately 100 reallocation agreements and just under 50 originally authorized agreements.

According to Corps officials, to initiate a reallocation agreement, a prospective M&I water user typically submits a request to the Corps, as shown in figure 5.[20] Before entering into a reallocation agreement, the Corps is to review the status of the project in its dam safety program and determine if a reallocation can be undertaken without unacceptable risks

[18]In 1991 we found that the Corps lacked the authority to reallocate storage under the Water Supply Act of 1958 in the absence of a physical modification to the project, and that the Corps disagreed with this conclusion. GAO, *Water Resources: Corps Lacks Authority for Water Supply Contracts*, RCED-91-151 (Washington, D.C.: Aug. 20, 1991). This report focuses on the Corps' pricing practices under the act, and does not evaluate the Corps' authority to enter into any specific reallocation agreement.

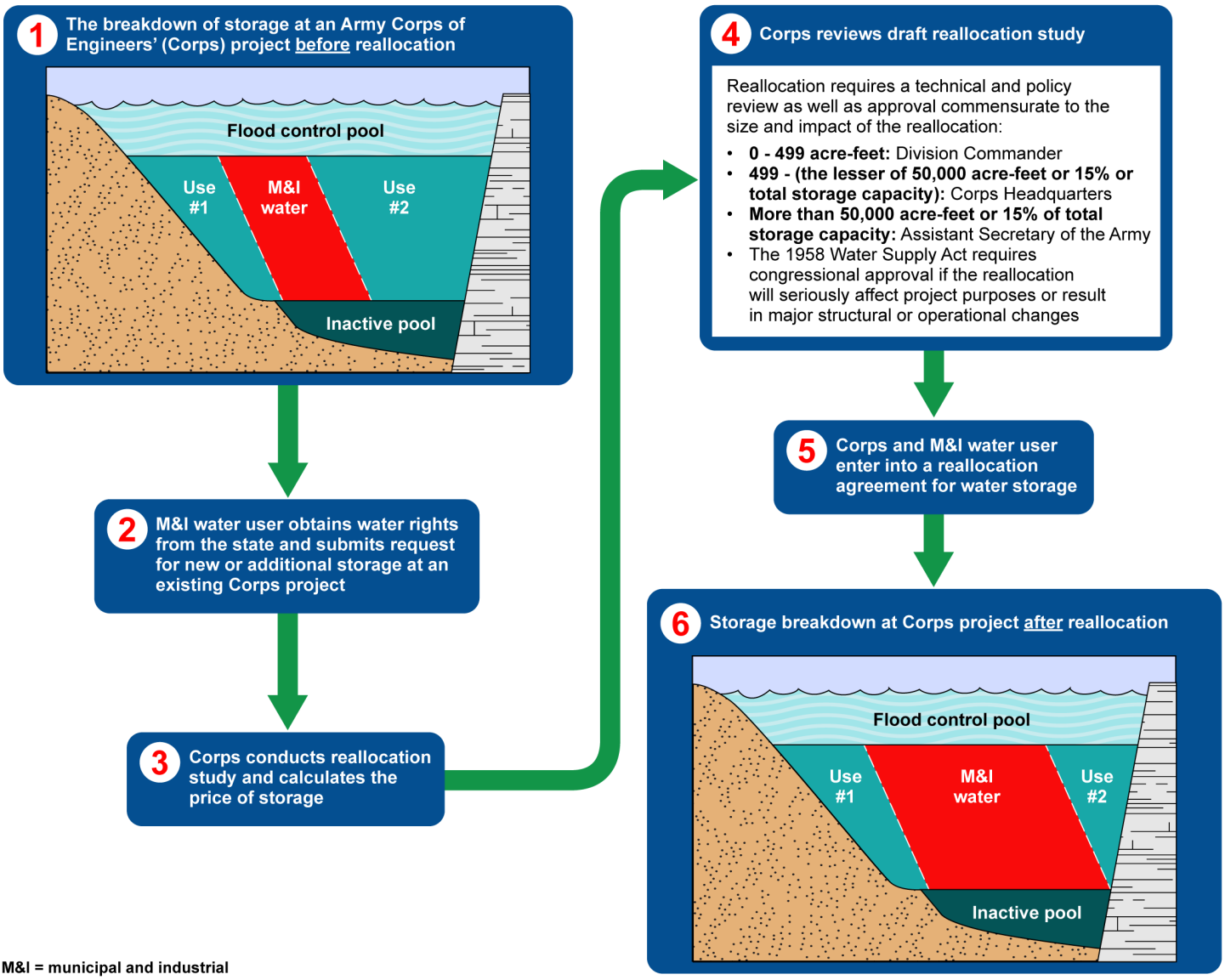
[19]U.S. Army Corps of Engineers, *2014 Municipal, Industrial, and Irrigation Water Supply Database Report* (Institute for Water Resources, August 2015).

[20]An M&I water user seeking a water storage reallocation generally makes a request to the Corps for the reallocation.

to public safety.[21] If the project is approved and funded, the Corps conducts a reallocation study to determine the feasibility of the proposed reallocation, significance of project modifications and effects on other authorized purposes, and the size and cost of the water storage reallocation needed to meet the water user's request. Corps officials at the district, division, and headquarters levels conduct analyses or review reallocation studies; these officials may include engineers, economists, environmental scientists, attorneys, and project managers. In addition, officials with specialized knowledge, such as from the Corps' centers of expertise, may also contribute to a reallocation study by providing technical assistance.

[21]As we reported in December 2015, since 2005, the Corps has used a risk-informed approach to select dams for safety-related repairs. To that end, the Corps developed the Dam Safety Action Classification system, based on a 5-point scale, to help guide key decisions for dam safety repairs. This risk classification system reflects the probability of a dam's failure and the potential consequences. As of July 2015, the Corps had placed 309 dams in actionable categories because the dams were determined to be at a moderate to very high risk of failure. From fiscal year 2007 to fiscal year 2016, the Corps selected 16 of these dams for repairs. GAO, *Army Corps of Engineers: Actions Needed to Improve Cost Sharing for Dam Safety Repairs*,GAO-16-106 (Washington, D.C.: Dec. 10, 2015).

Figure 5: U.S. Army Corps of Engineers' (Corps) Process for Reallocating Water Storage at an Existing Corps Project



M&I = municipal and industrial

Source: GAO analysis of U.S. Army Corps of Engineers policy. | GAO-17-500

Notes: The Corps may reallocate or reassign water storage at an existing project (e.g., reservoir) from one use to another, such as reallocating storage for hydropower generation to M&I water supply. The water user is responsible for obtaining the appropriate water rights under state law. The Corps does not provide water rights.

The Corps manages water storage projects that have a variety of uses such as storage for flood control, hydropower, and irrigation. For illustrative purposes, the figure depicts such uses as use #1 and use #2. In addition, Corps projects store millions of acre-feet of water for M&I purposes.

The inactive pool is the lowest storage area. Water in the inactive pool would only be used during extreme droughts or emergencies.

Dashed lines are not physical separations. The lines are used to indicate increases and decreases in the storage volume of existing uses within the reservoir as a result of a storage reallocation agreement.

The level of approval necessary within the Corps depends on the size and impact of the M&I water storage reallocation. If the reallocation will require major structural or operational modifications to the project or seriously affect authorized project purposes, the Water Supply Act of 1958 requires that Congress approve the reallocation study recommendations. Once congressional approval is obtained, the Assistant Secretary of the Army for Civil Works is to approve the agreement. When the reallocation does not require major structural or operational modifications to the project or seriously affect authorized project purposes, the Assistant Secretary of the Army for Civil Works approves the resulting reallocation agreement. The Assistant Secretary of the Army for Civil Works is to review and approve the first M&I water storage agreement at any project. Otherwise, the Assistant Secretary of the Army for Civil Works has delegated authority to Corps headquarters to approve agreements when the total amount of storage space reallocated for a project for M&I water does not exceed the lesser of 15 percent of the total storage capacity of the project or 50,000 acre-feet. Corps headquarters has further delegated approval authority to division commanders for water storage up to 499 acre-feet and to district commanders for up to 99 acre-feet.[22]

Both types of water storage agreements generally specify either that the water user is to repay (1) as a lump sum the first costs, such as costs for relocations, engineering, and design, associated with M&I storage at the time the agreement is enacted; or (2) over time for a period of up to 30 years with interest. According to Corps guidance, in the case of originally authorized agreements signed after 1986, the repayment period may not extend beyond 30 years from the date when the project was completed and placed in service or the date the first M&I water storage agreement for the project was signed, whichever is later. According to Corps officials, because most water storage projects were completed before 1980, there are few projects with originally authorized storage space that may still amortize the repayment of new agreements. In the event that repayment

[22]43 U.S.C. §390 b (d).

of originally authorized storage can be amortized, the Corps uses the current interest rate established under the Water Supply Act of 1958 and recalculates, accordingly, the terms of repayment every 5 years.

Any water user with an active M&I storage agreement approved after the Water Resources Development Act of 1986 is to repay a percentage of the relevant project's annual O&M costs to the Corps. The Corps considers O&M costs for the purpose of M&I water supply to consist of a portion of the joint-use costs—costs incurred at a project for improvements and repairs that benefit multiple authorized purposes, such as dredging of sedimentation that increases storage space at a project—and any costs specific to the M&I water supply purpose. The Corps then allocates a portion of the joint-use O&M costs to each individual M&I water user based on the terms of their agreement. In the case of reallocated M&I water storage agreements, the portion of joint-use costs assigned to the M&I water user is based on the percentage of the total useable project storage space. For example, if a water user has a reallocation agreement with the Corps for 10 percent of the storage space at a project, the user will repay 10 percent of the joint-use O&M costs for the project annually.

The Corps Houses M&I Water Storage Agreement Data in a Centrally-Managed Database

According to Corps officials, the district offices are responsible for recording and maintaining data on M&I water storage agreements and any related legal documents, which they input in the Corps' OMBIL system. Information specific to M&I water storage agreements is housed in the water supply module within OMBIL, which includes data on volume of storage, project cost, water users with whom the Corps has an agreement, and the date of the agreement.[23] The Corps uses OMBIL data to respond to congressional requests about M&I water storage agreements and to publish publically-available reports, such as its M&I Water Supply Database report. This report has been published periodically since 1998.[24] In addition to information on M&I water storage agreements, OMBIL contains information on other Corps' responsibilities,

[23]The Corps' Resource Management Division oversees the Corps of Engineers Financial Management System. This system handles all financial transactions within the Corps. The agency uses the system to generate bills and track repayment.

[24]The first M&I Water Supply Database report to include OMBIL data was the 2009 report, published in January 2010.

such as navigation and environmental stewardship, which the agency maintains in separate modules.[25]

The Corps Uses Different Methods to Set M&I Water Storage Prices Based Primarily on the Type of Agreement

The Corps uses different methods to set M&I water storage prices, primarily depending on whether the price is for an originally authorized or reallocation agreement. For originally authorized agreements, the Corps sets M&I water storage prices using the Separable Costs-Remaining Benefits method, which adds the costs for a specific water storage purpose and the joint-use costs for a project. For reallocated M&I water storage agreements, the Corps sets storage prices based on the highest costs derived from one of four pricing methods.

The Corps Uses the Separable Costs-Remaining Benefits Pricing Method for Originally Authorized Agreements

Originally authorized agreements are for water supply that was included in storage plans prior to the construction of a reservoir.[26] To initiate an originally authorized agreement, after a project is constructed, the Corps sets the price for water storage by allocating cost to the M&I water user through the Separable Costs-Remaining Benefits method.[27] As outlined in a Corps planning document, costs allocated to each project purpose are the sum of the (1) specific costs and (2) joint-use costs.

- **Specific costs.** The specific costs for a project are costs serving only one project purpose. For example, according to Corps officials, the specific costs for M&I water supply could include the costs of a Corps-constructed intake structure that would allow a specific M&I water user to withdraw water from the project.[28]
- **Joint-use costs.** The joint-use costs for a project consist of the sum of the separable costs for each project purpose (i.e., the costs to add that purpose to the project), plus a share of the remaining costs (i.e.,

[25]For the purposes of our report, we only reviewed the water supply module within OMBIL.

[26]The Department of the Army, the Department of the Interior, and the Federal Power Commission entered into a 1954 interagency agreement that established the Separable Costs-Remaining Benefits method as the preferred method for these agencies when establishing M&I water storage prices. The Federal Energy Regulatory Commission was established in 1977, as the successor to the Federal Power Commission.

[27]For more information about the Separable Costs-Remaining Benefits method, see https://planning.erdc.dren.mil/toolbox/webinars/16Mar2-costallocation_watersupply.pdf.

[28]An intake structure is a facility in a reservoir that allows for the controlled withdrawal of water.

total project costs minus the sum of the separable costs). For M&I water storage, the joint-use costs would be the share allocated to M&I water users of all project costs not associated with specific project features. For example, joint-use costs could include the costs of constructing the project's dam, a cost that benefits all project purposes.

Corps officials we interviewed said that the last projects with originally authorized M&I water storage were constructed in 1991, and the Corps has not constructed a new water storage project since the early 1990s. Corps officials we interviewed also said that the agency is not studying or planning the construction of any new projects, as of the time of our review. As a result, Corps officials said that the Corps has not recently used this pricing method.

The Corps Sets the Price for M&I Water Reallocation Agreements Based on the Highest of Four Pricing Methods

As described in a Corps' planning policy document,[29] the agency sets the price for reallocated M&I water storage based on the highest costs derived from one of the following four pricing methods.

- **Updated cost of storage:** This method uses cost indexes to escalate original storage construction costs to present-day price levels.[30] According to Corps officials, the Corps does not account for the current condition of a project when using this method. This is the most frequently used method.
- **Benefits foregone:** Under this method, the Corps estimates the benefits that would be foregone as a result of reallocating storage from one purpose to M&I water storage. For example, if the reallocation of storage occurs from the flood control pool, there may be foregone flood control benefits. Benefits foregone is the second most frequently used method.
- **Revenues foregone:** Under this method, the Corps estimates the revenues that would otherwise have been paid to the U.S. Treasury

[29]U.S. Army Corps of Engineers, *Planning Guidance Notebook, Appendix E,* ER1105-2-100, April 2000.

[30]The Corps uses the *Engineering News Record Construction Cost Index* for dates prior to 1967. The index measures how much it costs to purchase a mix of construction, labor, and materials compared to what it cost in the base year. The index includes data on materials prices and labor rates. For 1967 to the present, the Corps uses the *Civil Works Construction Cost Index System*, a Corps' publication that provides historical and forecasted cost indexes for use in civil works estimates of construction costs.

had the storage reallocation not occurred. According to Corps officials, the method most frequently applies to revenues foregone from a reduction in hydropower generation for reallocation to M&I water storage at a Corps project.[31]

- **Replacement cost:** According to Corps officials, this method calculates the cost of providing equivalent benefits by other means to replace those benefits reduced by reallocating storage to M&I water uses. For example, using this method for reallocating from flood risk management to M&I water storage, the Corps calculates the cost of constructing a separate flood risk management project to provide benefits equivalent to the benefits reduced by the reallocation of the flood storage.[32]

Corps officials we interviewed who were knowledgeable about water storage pricing policy stated that they did not know the detailed history of the Corps' adoption of these pricing methods.[33]

[31]Revenues foregone occur most frequently with hydropower uses, and as a result, are calculated by the Corps' Hydropower Analysis Center.

[32]According to Corps officials, this method only applies to reallocations of flood storage that required congressional approval, such as when the reallocation would involve a major structural or operational change.

[33]According to a Corps official, three of the reallocation methods (the updated cost of storage, benefits foregone, and revenues foregone methods) were first formally described in a Corps' policy document in 1977. The official said the document set the storage cost to be charged as the highest cost based on one of these three methods. The document also mentioned the use of the replacement cost method, but the Corps did not require its use when setting reallocated storage prices. Another Corps' policy document, issued in 1982, appears to be the first time that the use of all four methods was required, according to the official.

Variability of M&I Water Storage Agreement Prices Cannot Be Reliably Determined, but Some Officials Cited Multiple Factors That May Affect Prices Set by the Corps

Based on our review of M&I water storage agreement data stored in the Corps' OMBIL database and discussions with agency officials, we could not determine the extent to which storage prices varied because Corps' data were not sufficiently reliable for such an analysis. However, some Corps officials and a few M&I water users and stakeholders stated that water storage prices vary, and agency officials identified several factors that may contribute to the variation, including the original construction costs for a project and the authorized purposes of the project.

Corps' Data Were Not Sufficiently Reliable to Determine the Variability of Prices in M&I Water Storage Agreements

We could not determine the extent to which there was variability in M&I water storage agreement prices set by the Corps because agency data were not sufficiently reliable for such an analysis. Our review of the Corps' OMBIL database, the most recent Corps' M&I Water Supply Database report available at the time of our review, and interviews with knowledgeable Corps officials, identified three key issues affecting the reliability of the Corps' data.[34]

- **Some data contained errors.** We identified errors in the data for some of the M&I water storage agreements contained in OMBIL. For example, we compared information from a randomly selected sample of nine agreements from the Corps' Kansas City, Savannah, and Tulsa districts to the corresponding data in OMBIL. In one instance, we identified a discrepancy between the date an agreement was signed and the date listed for that agreement in OMBIL. When we asked Corps officials about this discrepancy, one official stated that the date on a signed agreement is not always the same as the date when the agreement went into effect—that is, the date when the water user begins repayment. According to the Corps' OMBIL user manual, agreement dates recorded in OMBIL should be the same as the date on which the agreement was signed. In reviewing the agreement date field in the OMBIL data, it was not always clear whether the date district staff entered in OMBIL was the date the agreement was

[34]U.S. Army Corps of Engineers, *2014 Municipal, Industrial, and Irrigation Water Supply Database Report* (Institute for Water Resources, August 2015).

signed or the date the agreement went into effect. In another instance, the data in OMBIL indicated that the cost for a conduit was "$3,1620." When asked about this entry, Corps officials we interviewed said that the cost should have been entered as "$3,162." Corps officials said that they identified errors in the Corps' data during the Corps' limited quality control review of the data. For example, the M&I Water Supply Database report published in 2015, which was based on OMBIL data, indicated that the Corps set prices for four separate reallocation agreements using the replacement cost method. When we asked Corps officials to verify the information about the cost method used to set prices for these four specific agreements, they stated that the prices were not set using the replacement cost method and that they had corrected the information in OMBIL to indicate that the costs for these agreements were established using the updated cost of storage method.

- **Some data were missing.** We identified multiple instances where specific information about an M&I water storage agreement was missing in the corresponding OMBIL data. For example, OMBIL data for over 35 agreements did not include data for certain fields, such as the year of the agreement. In another case, we found that the data indicated that there should be a conduit cost for the agreement, but that cost was not entered into OMBIL. Corps officials also identified some agreements for which data should have been included in OMBIL but were not recorded in the database.
- **Some inconsistencies existed in how data were recorded in the database.** We also identified some inconsistencies in how certain M&I water storage agreement data were recorded in OMBIL. For example, conduit costs for some agreements were included in the cost of the storage project, whereas in other instances, conduit costs were recorded as separate line items (i.e., the conduit costs were not included in the project cost).

When asked about their confidence in the quality of OMBIL M&I water storage agreement data, Corps officials said that their level of confidence varied by data field. In particular, officials said that, as a result of their quality control review, they were most confident in data on M&I water storage volume, original project cost, and remaining project payments. These officials explained that these data are used to support two of the agency's performance metrics that are reported to the Office of Management and Budget. The officials expressed less confidence, however, in other types of information. For example, the officials said that data on reallocation sources and pricing methods are complete but of unknown accuracy. According to the officials, some of the agreements

are several decades old, making it difficult to locate source documents necessary to verify information. In addition, the officials said that they did not know how accurate the data were when they were first entered into OMBIL around 2007. Overall, Corps officials responsible for overseeing the M&I water storage agreement data in OMBIL said they believe the data published in the M&I Water Supply Database report published in 2015 is "reasonably accurate and reliable for programmatic reporting." The officials acknowledged, however, that errors and inconsistencies can still be found in the details of individual agreement data.

Corps officials said that they do not systematically review the M&I water storage data, such as regularly tracing OMBIL data back to the originating agreement to ensure the data in OMBIL are accurate. Instead, Corps officials said they conducted a limited quality control review of the M&I water storage agreement data in OMBIL, as of fiscal year 2016. As part of this review, officials said that they compared data on agreements for a specific project contained in one part of the OMBIL water supply module with project-level data contained in a different part of the module. If the data did not match, the officials reviewed the data to determine why there may be errors. To help resolve errors identified in the review, headquarters officials said they contacted the districts but have not received responses from them all; the headquarters officials said they will continue working with division and district offices to correct errors as resources permit.

Under federal standards for internal control, agency management should use quality information to achieve agency objectives.[35] Such information should, among other things, be complete and accurate, but as we found, the information in the OMBIL database is neither complete nor accurate. The lack of reliable data that the Corps uses to report information on M&I water storage agreements may result in the Corps presenting inaccurate information to Congress and the public, such as in its M&I Water Supply Database reports. In addition, the Office of Management and Budget may not have an accurate understanding of whether the Corps is achieving its goals related to the M&I water storage agreements, since the Corps uses OMBIL data to support performance metrics that it reports to the Office of Management and Budget. Corps officials said they currently plan on updating certain tables in the M&I Water Supply Database report every

[35]GAO, *Standards for Internal Control in the Federal Government*, GAO-14-704G (Washington, D.C.: September 2014).

fiscal year and updating the report itself every other fiscal year. Therefore, the officials said that new data should go no longer than 2 years without a quality control review. However, as we previously noted, we found the quality control review to be limited and did not, for example, trace the OMBIL data back to the information contained in the originating agreements. Without systematically reviewing and correcting, as appropriate, data on M&I water storage agreements in the OMBIL database, the Corps cannot ensure it is providing users of the information, such as the Congress, the Office of Management and Budget, and the public, with accurate and reliable information on M&I water storage agreements.

Corps headquarters officials said they do not currently have plans to systematically review the M&I water storage agreement data in OMBIL in the future because the agency does not have a policy and implementing guidance requiring a review of the data. The officials said the agency has limited resources available to conduct systematic reviews of the M&I water storage agreement in OMBIL. For example, one headquarters Corps official with oversight responsibility of the M&I water storage agreement data in OMBIL estimated that regularly reviewing the data would involve at least one full-time employee for a full year. However, the official said that the Corps does not currently have employees who spend all their time overseeing the M&I water storage agreement data in OMBIL. Furthermore, Corps officials said that many storage agreements were established decades ago and predate current staff, making it difficult and time-consuming to rectify any identified errors.

Federal internal control standards require that agency management design control activities to achieve objectives and respond to risks by, for example, clearly documenting internal controls in management directives, administrative policies, or operating manuals. In addition, under federal internal control standards, agency management should design control activities, such as controls over information processing, to achieve objectives and respond to risks.[36] Such control activities can include conducting systematic edit checks of data entered. For example, as discussed in our 2009 guide for assessing the reliability of computer-processed data,[37] process controls that could affect the accuracy and

[36]GAO-14-704G.

[37]GAO, *Assessing the Reliability of Computer-Processed Data,* GAO-09-680G (Washington, D.C.: July 2009 External Version I).

completeness of data include management reviews of at least a sample of data entries to ensure that key fields are accurate, nonduplicative, and sensible. Systematic management reviews include a random sample of cases that management reviews during each period.

While identifying all individual M&I water storage agreements and related files and comparing them with the corresponding information in OMBIL to verify the accuracy of the data may be time-consuming, one option discussed in our guide for assessing the reliability of computer-processed data is to trace only a sample of agreements, as sampling saves time and cost.[38] Without developing policy and implementing guidance on how staff should conduct systematic reviews of the M&I water storage agreement data in OMBIL, the Corps will continue to have issues related to the reliability of the data.

Some Corps Officials Cited Several Factors That May Affect M&I Water Storage Prices

While we were unable to determine the extent to which storage prices varied, some Corps officials and a few water users and stakeholders we interviewed said that the Corps' M&I water storage prices do vary. When asked why prices may vary, Corps officials said that each project and agreement is unique and identified the following factors as among the reasons why the prices they set for M&I water storage can vary among agreements and projects.

- **Original cost of construction.** The original cost of construction varies by project and affects the price the Corps sets for M&I water storage. Specifically, factors related to geography, topography, and construction materials will affect construction costs. For example, costs to build a project located on a narrow river may be less expensive than a project located on a wider river. In addition, the cost of materials required for a specific project, such as an earthen versus a concrete dam, also affect project costs.
- **Year of agreement.** The year in which the M&I water user and the Corps signed the water storage agreement also affects Corps' water storage prices, according to Corps officials. Specifically, inflation may increase the prices that the Corps charges for storage over time (in nominal dollars that are not adjusted for inflation).
- **Environmental mitigation.** Corps officials said that water resources' project costs and water storage prices have increased over time due

[38]GAO-09-680G.

to the environmental mitigation costs associated with Corps' projects. Specifically, Corps officials explained that M&I water storage agreements signed after certain environmental laws were enacted may have higher costs of storage as a result of the laws. In particular, one official cited the National Environmental Policy Act of 1969, and the Endangered Species Act of 1973, which potentially result in increased costs from analysis and mitigation actions to reduce or eliminate adverse environmental effects caused by changes to a Corps' project.

- **Electricity costs.** According to a Corps official, variation in electricity costs may be due to factors such as volatility in oil, gas, or thermal power prices. More specifically, when applying the benefits foregone method to set the price for M&I use under a water storage reallocation agreement, the Corps calculates the benefits lost by power marketing administrations, which operate electric systems and sell the electrical output of federally owned and operated hydroelectric dams, from the reallocation of storage. In doing so, the Corps identifies the costs to the power marketing administration to produce a similar amount of electricity from another source. According to Corps officials, costs for electrical power vary over time, and the resulting benefit foregone may, therefore, vary as well.
- **Authorized project purposes.** Authorized project purposes may influence the price of water storage. For example, in the Corps' projects where hydropower is an authorized use, the Corps' reallocation study calculates the benefits foregone from reallocating storage for hydropower production to storage for M&I water use. The foregone benefits associated with hydropower generation may be different than storage reallocation from another use, such as flood control, thereby affecting the resulting price of water storage.
- **Repayment schedule.** A water user's repayment schedule may affect the total price paid for water storage. When the Corps and an M&I water user enter into a water storage agreement, the water user may repay the principal water storage cost as a one-time lump sum payment, amortize the payment with interest for up to 30 years, or make a combination of lump sum and amortized payment. If the water user amortizes repayment, the total cost the user pays would be dependent upon the cumulative interest they pay. If a water user makes a lump sum payment, the user may pay less for the storage than if this user opted to make amortized payments, including interest, for up to 30 years.

M&I Water Users We Interviewed Were Generally Satisfied with the Corps' Water Storage Pricing Process, but Water Users and Stakeholders Also Cited Some Concerns

Many M&I water users we interviewed said they were generally satisfied with the Corps' process for setting water storage prices, but many water users and stakeholders also cited some concerns.[39] Specifically, many M&I water users and water stakeholders identified concerns related to their water storage agreements, primarily the length of time it takes to complete the reallocation agreement process.[40] Also, many M&I water users and stakeholders we interviewed cited concerns, including limited information in O&M bills for day-to-day expenses to operate and maintain the project and variation in the charges contained in these bills.

M&I Water Users We Interviewed Were Generally Satisfied with the Corps' Water Storage Pricing Process

Many M&I water users we interviewed were generally satisfied with the Corps' water storage pricing process.[41] For example, one water user said the process was carried out equitably based on meetings with the Corps. Another M&I water user said it thought the Corps' storage price allows the water user to charge its customers a fair price while meeting customers' water supply needs. Another water user said building a new reservoir would be more expensive than entering into a contract for M&I water storage with the Corps.

Some of the M&I water users that reported being generally satisfied with the Corps' water storage pricing process also said that they have good relationships with the Corps. For example, one M&I water user said it met

[39]We interviewed 26 water users with M&I water storage agreements in the following three Corps districts: Kansas City, Savannah, and Tulsa. Our sample of M&I water users included cities, water districts, water authorities, and cooperatives. Throughout this section we use the terms, "few," "some," and "many" to describe the number of responses we received from water users and water stakeholders. For additional information on how we define these terms, see appendix I.

[40]We also interviewed 14 water stakeholders that included officials from nonfederal entities that may have M&I water storage agreements with the Corps but were not selected as part of our sample of agreement holders in the Corps' Kansas City, Savannah, and Tulsa districts. Stakeholders also included industry groups and representatives of the hydropower industry who operate hydropower plants at some Corps projects.

[41]During the interviews with M&I water users and stakeholders, we asked about their general views and concerns with the Corps' water storage pricing process. Not all interviewees provided responses to these questions.

with the Corps numerous times and the Corps provided copies of relevant documents to update the water user throughout the pricing process. Another M&I water user said it has an "outstanding" relationship with the Corps and can contact specific Corps officials within the water user's district to get answers on the terms of its agreement as well as day-to-day operations at the Corps project. Many other M&I water users said that while they had not reached out to the Corps about the pricing process they would feel comfortable doing so if questions arose.

Conversely, some other M&I water users stated they did not have opinions on the Corps' process for setting water storage prices, for various reasons. For example, one M&I water user said that it did not know what price M&I water users were charged for water storage at other Corps projects. In another instance the storage agreement of one water user we interviewed was signed 44 years ago and the staff who were involved in developing the agreement no longer work at the office. Therefore, current staff were not able to offer an opinion on the Corps' pricing process because they were not involved in developing the agreement.

M&I Water Users and Stakeholders We Interviewed Cited Concerns with the Time to Complete the Reallocation Agreement Process

Many M&I water users and stakeholders we interviewed cited concerns with the length of time it takes the Corps to complete the process for establishing water storage reallocation agreements. For example, one M&I water user said it took 16 years to finalize one study for the water user's reallocation request. A water stakeholder also said it encountered significant delays over the years from the first time it requested a reallocation in 2005 and were unsure of when the Corps would make a final decision on the request.[42]

A few M&I water users provided examples of how a delay in completing the reallocation process can hamper their ability to meet customers' water supply needs. For example, one M&I water user said that in the 16 years it took the Corps to finalize its reallocation study, the community faced a drought that put its ability to meet the water storage needs of a local nuclear power plant at risk and could have affected the plant's ability to supply energy to its customers. In another instance, delays in completing

[42]In 2005, the water user, as part of a larger association, submitted a reallocation request to the Corps. The reallocation study was temporarily halted in 2006 due to concerns with dam safety, but the study resumed in 2011. The Corps and association signed a reallocation agreement in May 2017.

the reallocation process required one M&I water user to search for additional water resources to meet its existing water demands. This M&I water user, a power generating company, said the reallocation process took longer than expected and disrupted the time frames for bringing a new power plant online. As a result of the delay in finalizing a reallocation agreement with the Corps, this M&I water user said that it entered into a short-term contract for water storage with a different nearby M&I water user that already had a water storage agreement with the Corps. According to the M&I water user, this alternative arrangement cost an estimated $2 million dollars but is likely less than the amount the water user would have lost had the new plant remained offline as the water user waited for the Corps to complete the reallocation process.

Corps officials acknowledged that the amount of time needed to complete the water storage reallocation process varies and can be affected by such factors as litigation and funding. For example, according to Corps officials, litigation can slow the reallocation process. Officials said a request for a reallocation at the Chatfield Lake in Colorado took longer than expected because the Corps was immediately sued after completing the reallocation study.[43] Officials also said that an ongoing reallocation agreement in the Willamette River Basin in Oregon had been delayed because litigation related to certain fish species protected under the Endangered Species Act has taken years to resolve, thereby delaying the completion of the reallocation study. Limited funding is another factor cited by Corps officials that can slow the reallocation process. For example, Corps officials said that the agency or water user cannot always secure the funding for reallocation studies, which can delay the completion of the reallocation process.

M&I water users we interviewed with a reallocation agreement with the Corps said that they estimated the time to finalize these agreements ranged from about 6 months to 16 years but did not provide documentation to confirm these estimated time frames. Corps officials also said they were unable to provide estimated time frames because the agency does not systematically track the time it takes to complete the reallocation agreement process.

[43]According to a Corps document, the Chatfield reallocation agreement was completed in September 2014. However, according to a Corps report published in June 2017, the agreement has not been fully implemented and the water user does not currently have access to the water storage.

The Corps has taken some steps to help ensure that funding is available for reallocation studies and to help improve processes for completing water storage reallocation agreements and other types of infrastructure projects. For instance, the Energy and Water Appropriations Act for Fiscal Year 2012 authorized the Corps to accept voluntary contributions from nonfederal interests for any authorized water resources development study or project.[44] Corps officials said that this expanded authority may help ensure that resources are available to complete reallocation studies. Corps' guidance states that typical studies, including reallocation studies funded under the Investigations account,[45] should be completed in 18 to 36 months.

The Corps also implemented a "3x3x3" rule for studies started in June 2014 and later. This rule directs Corps officials to complete certain reallocation studies within 3 years of initiation, for less than $3 million, and with three levels of review (at the district, division, and headquarters levels). Corps officials said that studies subject to this rule are tracked across the agency in the Program and Project Management system, which the Corps uses to create and maintain project schedules and budgets. However, not all reallocation studies are subject to this rule. For example, Corps officials said that most reallocations do not require congressional authorization and therefore are not subject to the rule. Officials also said that the Corps does not track reallocation studies completed with Operation and Maintenance funding in agency databases.[46]

Under standards for internal control in the federal government, management should design control activities to achieve objectives and respond to risks.[47] Such activities include promptly recording all transactions to maintain their relevance and value to management in

[44]Pub. L. No. 112-74, div. B, tit. I, § 111, 125 Stat. 858 amending 33 U.S.C. § 701h. The provision had previously covered only flood control and environmental restoration projects.

[45]According to Corps officials, the Corps has various accounts it can use to fund its work for reallocating storage. These officials said that the Investigations account funds studies to determine the necessity, feasibility, and returns to the nation for potential solutions to water resource problems, as well as design, engineering, and other work.

[46]According to Corps officials, the Operation and Maintenance account funds inspection, operation, maintenance, and related activities for water resources projects operated and maintained by the Corps.

[47]GAO/AIMD-00-21.3.1.

controlling operations and making decisions. This applies to the entire process or life cycle of a transaction or event from its initiation and authorization through its final classification in summary records. As of our report, the Corps does not have data on reallocation study milestones that could help inform the Corps' ongoing efforts to improve project processes. Without collecting and analyzing data on the length of time it takes to complete the reallocation process, including data on its initiation and authorization through its final decision, the Corps does not have the information necessary to measure progress in implementing initiatives designed to improve its planning process as well as identifying areas that may hinder the Corps' ability to complete projects in a timely manner.

M&I Water Users and Stakeholders We Interviewed Raised Concerns Regarding O&M Bills

Many M&I water users and stakeholders we interviewed cited concerns about the O&M bills they receive from the Corps, including lack of detailed information contained in bills and variation in annual O&M charges. Specifically, these water users and stakeholders said the O&M bills they receive from the Corps contain limited information about what charges have been included or how the Corps calculated the amount charged. For instance, one stakeholder said its O&M bills contain costs labeled "betterments" without additional detail as to what O&M activities were included in those costs. M&I water users said the lack of detail in O&M bills may make identification of billing errors difficult. For example, one M&I water user said that the Corps incorrectly included a portion of the costs for constructing a new playground at a Corps project in the water user's bill. According to the water user, the playground costs should not have been included in its bill because this cost was not related to M&I water supply. The water user said that it was only able to determine the error after requesting that the Corps provide an itemized O&M bill for that year. When the M&I water user brought the error to the Corps' attention, the water user said the Corps removed the costs from the water user's bill. According to Corps officials, district offices work with individual agreement holders to answer questions and provide additional information as needed.

M&I water users also said that the O&M charges included in its bills can vary from year to year without advanced notification. For example, one M&I water user said that its annual O&M bills are generally around $650,000, but with little notice, the Corps sent an O&M bill for the work that was for millions of dollars. According to the water user, it was able to work with the Corps to pay this O&M bill but unexpected increases in bills raise concerns about the ability to afford what is charged in O&M bills in the future. According to Corps officials, O&M bills vary over time,

depending on what O&M activities the Corps conducts for each project in a given year. Corps officials also said that as required by the Water Resources Reform and Development Act of 2014, in fiscal year 2016, the agency began providing 5-year projections of annual O&M activities and costs to M&I water users, which they said should help water users plan for future project improvements.[48] It is too early to assess how these projections will address water users' concerns.

Conclusions

Future demand for water storage at federal projects will likely increase as M&I water users work to meet their customers' needs and as some regions in the country face droughts and other threats to existing water supplies. Meeting the increased demand will entail that the Corps maintain reliable data on its M&I water storage agreements. However, the Corps does not have sufficiently reliable data as the information in the Corps' OMBIL database is neither complete nor accurate. The lack of reliable OMBIL data that the Corps uses to report information on M&I water storage agreements may result in the Corps presenting inaccurate information to Congress and the public. Without systematically reviewing and correcting, as appropriate, data on M&I water storage agreements in the OMBIL database, the Corps cannot ensure it is providing users of the information with accurate and reliable information on M&I water storage agreements. Moreover, the Corps does not currently have plans to systematically review the data because the agency does not have a policy and implementing guidance requiring review of the M&I water storage agreement data in OMBIL. Without this policy and guidance, the Corps will continue to have issues related to the reliability of the data.

While the Corps has begun efforts to help improve its processes, it does not systematically track the time it takes to complete the water storage reallocation agreement process—a concern raised by many M&I water users we interviewed since delays could potentially affect water users' ability to meet the water supply needs of local communities. Without collecting and analyzing data on the length of time it takes to complete the reallocation process, including data on its initiation and authorization through its final decision, the Corps does not have the information necessary to measure progress in implementing initiatives designed to streamline its planning process as well as identifying areas that may hinder the Corps' ability to complete projects in a timely manner.

[48]Pub. L. No. 113-121, § 1046(b), 128 Stat. 1254 (2014).

Recommendations for Executive Action

We recommend that the Secretary of the Army direct the Chief of Engineers and the Commanding General of the U.S. Army Corps of Engineers to take the following three actions:

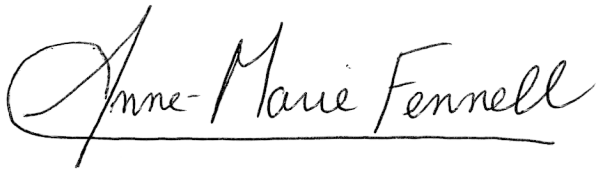
- systematically review data on municipal and industrial water storage agreements stored within the OMBIL system and correct errors, as appropriate, to ensure that the data are accurate and complete;
- develop policy and implementing guidance directing staff to conduct systematic reviews of M&I water storage agreement data in OMBIL; and
- collect and analyze data on the length of time it takes to complete the reallocation process.

Agency Comments

We provided a draft of this report for review and comment to the Department of Defense. In its written comments, reprinted in appendix II, the department concurred with all three of our recommendations and described the actions they plan to take. Specifically, the Corps will perform a systematic review of storage and cost data in the OMBIL system related to M&I water storage agreements to meet accuracy and completeness standards; develop policy and implementing guidance for staff to conduct such reviews; and collect and summarize data starting with ongoing reallocation studies to determine the length of time it takes to complete these studies.

As agreed with your offices, 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 to the appropriate congressional committees, the Secretary of Defense, 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 regarding 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 the report are listed in appendix III.



Anne-Marie Fennell
Director, Natural Resources and Environment

Appendix I: Objectives, Scope, and Methodology

Our objectives for this report were to examine (1) how the U.S. Army Corps of Engineers (Corps) sets municipal and industrial (M&I) water storage prices, (2) what is known about the variability, if any, of those prices, and (3) M&I water users' and stakeholders' views on water storage prices and how the Corps sets M&I water storage prices.

To determine how the Corps sets M&I water storage prices, we reviewed laws related to the Corps' authorities regarding water storage. These laws include the Water Supply Act of 1958, Public Law 88-140 of 1963, the Water Resources Development Act of 1986, and the Water Resources and Reform Development Act of 2014. We examined key Corps' policies and guidance, such as the agency's *Water Supply Handbook*, to gather information on the processes the Corps uses to fulfill its M&I water storage responsibilities. We also interviewed knowledgeable Corps officials from various offices, such as the Institute for Water Resources and the Hydropower Analysis Center, to understand how the Corps calculates and considers the effects of water storage at Corps projects when setting storage prices.

We interviewed officials in three Corps' districts (Kansas City, Savannah, and Tulsa) to provide a more detailed understanding of the Corps' pricing process. We selected these three districts using a number of criteria, including data on differences in the total M&I storage space at Corps' projects in the district, number of M&I agreements in the district, and method used to set storage prices in reallocation agreements. These data were obtained from the Corps' primary water storage database—the Operations and Maintenance Business Information Link (OMBIL)—which maintains storage data on Corps' projects.

In assessing what is known about the variability in the prices the Corps charges for M&I water storage, we examined data in the OMBIL water supply module and determined that these data were not sufficiently reliable for such an analysis. We made this determination after identifying a number of concerns, such as errors in the data, missing data, and inconsistencies in how the data were recorded. For example, we used the data to compare a random sample of M&I water storage agreements to the corresponding data maintained in OMBIL to determine whether the data in OMBIL match the data in the agreements. We also interviewed Corps officials in headquarters and the three districts to verify the accuracy of the data. While we raised concerns about these data used in the Corps' M&I Water Supply Database reports, Corps officials said that the data are the best available on the Corps' agreements. Therefore, we present high-level data from the most recent report available at the time

of our review—the 2014 M&I Water Supply Database report published in 2015—to provide context for the M&I water storage agreements, such as the number of M&I water storage agreements the Corps has with water users. We also used data from the M&I Water Supply Database report to select the three Corps districts, as previously discussed.[1] In addition, we also interviewed Corps officials at headquarters and the district offices regarding the factors that may affect the cost of M&I water storage across agreements.

To determine M&I water users' and stakeholders' views on water storage prices and how the Corps sets M&I water storage prices, we interviewed a sample of 26 M&I water users in the three Corps districts. For the purposes of our report, M&I water users included cities, water districts, water authorities, and cooperatives with M&I water storage agreements with the three Corps districts. To determine our sample of M&I water users, we analyzed OMBIL data on the number of active M&I water storage agreements in the three Corps' districts. Because the total number of agreements for the Kansas City and Savannah districts are each less than 25, we included all M&I water users in those two districts. In comparison to these two districts, the Tulsa district had a greater number of active agreements (over 160 agreements). From these 160 agreements, we removed agreements that we determined to be outside the scope of our review based on a number of criteria. For example, we excluded agreements that would not fall under the Water Supply Act of 1958. Therefore, we selected a random sample of 25 M&I water storage agreements from the Tulsa district for review. In total, we conducted semi-structured interviews with 26 M&I water users. We were unable to interview the remaining 13 water users because they did not show up to the interview, declined to be interviewed, or did not respond to our requests for interviews.

[1]U.S. Army Corps of Engineers, *2014 Municipal, Industrial, and Irrigation Water Supply Database Report* (Institute for Water Resources, August 2015). The Corps periodically publishes information about its M&I water storage agreements in these M&I Water Supply Database reports, which date back to 1998. The Corps published an updated M&I Water Supply Database report in June 2017. The June 2017 report was not available at the time of our review; therefore, we refer to the August 2015 report as the most recent M&I Water Supply Database report available at the time of our review that presents data from the Corps' Operations and Maintenance Business Information Link (OMBIL). While we identified data reliability issues with OMBIL data as described in our report, we present high-level information about the Corps' water storage agreements for context.

We also interviewed a nongeneralizable sample of 14 water stakeholders. They included nonfederal entities that may have M&I water storage agreements with the Corps but were not in our sample of agreement holders in the three Corps districts; industry groups; and representatives of the hydropower industry who operate hydropower plants at some Corps projects and may be affected by reallocations for M&I water storage. We selected these stakeholders through various methods, such as extending open invitations for interviews at working group meetings where M&I water users were present. The samples we selected are not generalizable but provide illustrative examples and insights into how, if at all, the views of water users and stakeholders may differ in various locations.

We conducted a content analysis of the water users' and stakeholders' responses to identify common themes. The coding of responses was independently verified by a second analyst. We used the following categories as shown in table 2 to quantify M&I water users' and stakeholders' responses to report the results of our analysis.

Table 2: Categories for Quantifying Water Users' and Stakeholders' Responses

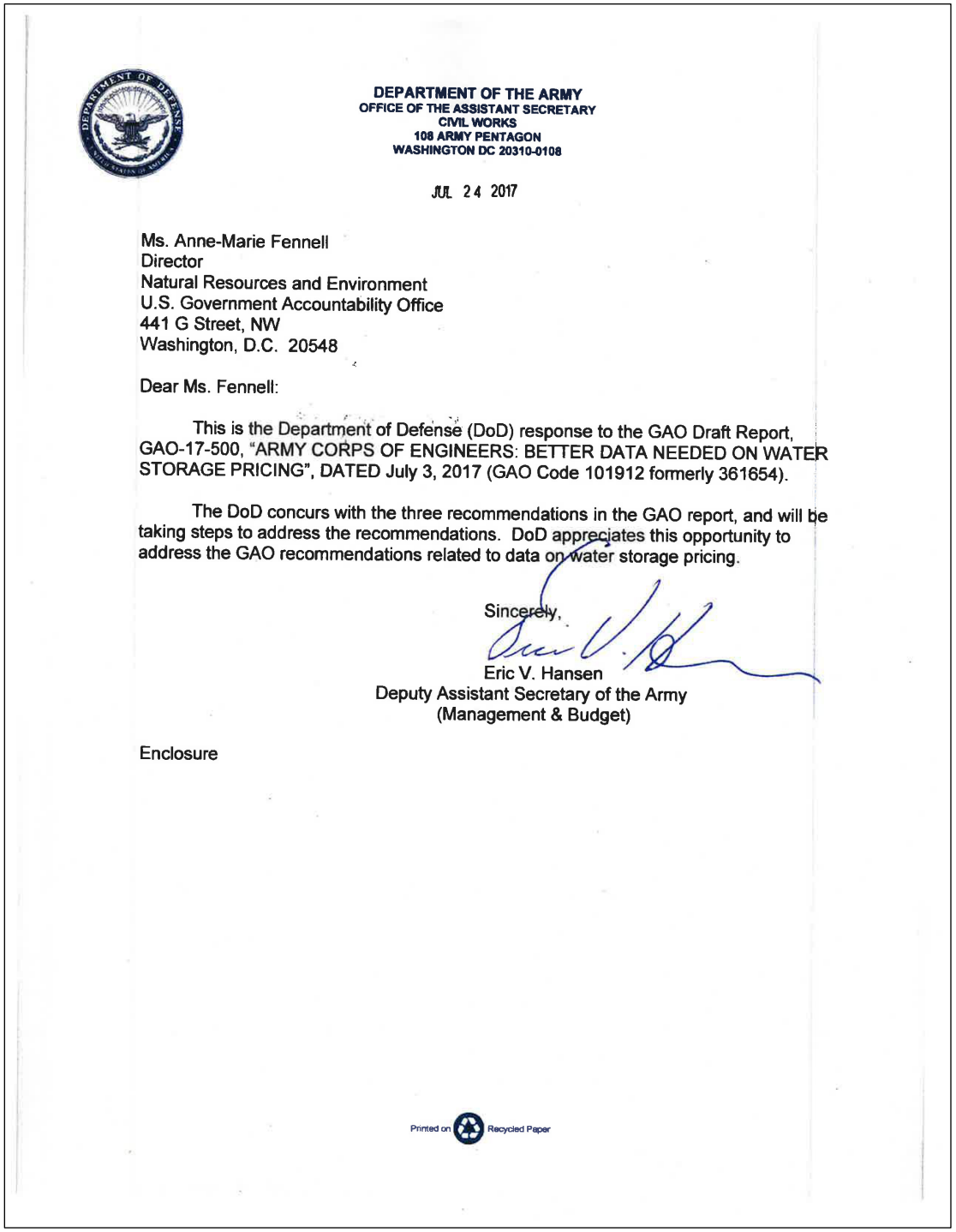
Response category	Water users	Water stakeholders	Both water users and stakeholders
Few	2–5 out of 26	2–3 out of 14	4–8 out of 40
Some	6–10 out of 26	4–6 out of 14	9–16 out of 40
Many	11–26 out of 26	7–14 out of 14	17–40 out of 40

Source: GAO analysis. | GAO-17-500

Finally, we spoke to Corps officials from headquarters as well as the Kansas City, Savannah, and Tulsa districts to learn how the Corps communicates with M&I water users and stakeholders.

We conducted this performance audit from July 2015 to August 2017, 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: Comments from the Department of Defense



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

JUL 24 2017

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

Dear Ms. Fennell:

This is the Department of Defense (DoD) response to the GAO Draft Report, GAO-17-500, "ARMY CORPS OF ENGINEERS: BETTER DATA NEEDED ON WATER STORAGE PRICING", DATED July 3, 2017 (GAO Code 101912 formerly 361654).

The DoD concurs with the three recommendations in the GAO report, and will be taking steps to address the recommendations. DoD appreciates this opportunity to address the GAO recommendations related to data on water storage pricing.

Sincerely,

Eric V. Hansen
Deputy Assistant Secretary of the Army
(Management & Budget)

Enclosure

Printed on Recycled Paper

GAO DRAFT REPORT DATED JULY 3, 2017
GAO-17-500 (GAO CODE 101912 formerly 361654)

"ARMY CORPS OF ENGINEERS: BETTER DATA NEEDED ON WATER STORAGE PRICING"

DEPARTMENT OF DEFENSE COMMENTS TO THE GAO RECOMMENDATION

RECOMMENDATION 1: The GAO recommends that the Secretary of the Army direct the Commanding General of the U.S. Army Corps of Engineers to systematically review data on municipal and industrial water storage agreements stored within the OMBIL system and correct errors, as appropriate, to ensure the data are accurate and complete.

DoD RESPONSE: Concur. USACE will perform a systematic review of storage and cost data in the OMBIL system pertaining to municipal and industrial water supply storage agreements in order to meet accuracy and completeness standards consistent with the principles identified in GAO-14-704G. Storage and cost data is directly related to the USACE water supply program's approved performance metrics in accordance with the Government Performance and Results Act.

RECOMMENDATION 2: The GAO recommends that the Secretary of the Army direct the Commanding General of the U.S. Army Corps of Engineers to develop policy and implementing guidance directing staff to conduct systematic reviews of M&I water storage agreement data in OMBIL.

DoD RESPONSE: Concur. USACE will develop policy and implementing guidance to conduct systematic reviews of M&I water storage agreement data in OMBIL.

RECOMMENDATION 3: The GAO recommends that the Secretary of the Army direct the Commanding General of the U.S. Army Corps of Engineers to collect and analyze data on the length of time it takes to complete the reallocation process.

DoD RESPONSE: Concur. USACE will collect and summarize data starting with ongoing reallocation studies to determine the length of time it takes to complete a reallocation study. Data on when funding was started and when the report was approved will be gathered from budgeting processes and scheduling systems. Because the number of studies could be considerable, and because the time to complete a reallocation process depends on a number of factors that are unique to individual projects, USACE will examine a representative sample of projects to determine what factors impacted the length of time to complete the sampled reallocation studies. USACE will track and maintain the amount of time to complete a reallocation study in the OMBIL database.

Appendix III: GAO Contact and Staff Acknowledgments

GAO Contact

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

Staff Acknowledgments

In addition to the contact named above, Vondalee R. Hunt (Assistant Director), John Delicath, Philip Farah, Rich Johnson, Kirsten B. Lauber, Mara McMillen, Emily Pinto, Oliver Richard, Dan C. Royer, Kiki Theodoropoulos, and Lisa Vojta made key contributions to this report.