FIVE-YEAR REVIEW AND UPDATE OF THE INLAND AND INTRACOASTAL WATERWAYS TWENTY-YEAR CAPITAL INVESTMENT STRATEGY

2020 CAPITAL INVESTMENT STRATEGY REPORT

U.S. Army Corps of Engineers

December 2020

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Prepared by the U.S. Army Corps of Engineers

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Executive Summary

The U.S. Army Corps of Engineers (USACE) operates and maintains a network of inland and intracoastal waterways that facilitates efficient movement of goods within the U.S. Much of this infrastructure was built over 50 years ago, resulting in a network of rapidly aging locks, dams, structures, and channels. In recent years, taxpayers have invested an annual average of approximately $920 million to operate, maintain, rehabilitate, and modernize inland navigation projects in order to maintain the system and provide reliable transportation. This review and update of the March 2016 *Inland and Intracoastal Waterways Twenty-Year Capital Investment Strategy* (2016 CIS Report) focuses on capital investment in this infrastructure, specifically improvements to existing projects (e.g., new locks and dams) and major rehabilitation of existing projects. The December 2020 *Inland and Intracoastal Waterways Twenty-Year Capital Investment Strategy* (2020 CIS Report) also identifies and explains changes to the project-specific recommendations contained in the March 2016 report (including any changes to the prioritization criteria used to develop the updated recommendations). These capital investments are funded in the Construction account and cost shared with the Inland Waterways Trust Fund (IWTF).

Authority

The 2020 CIS Report was prepared under Section 302(b) of the Water Resources Development Act of 1986 (WRDA 1986) as amended by Section 2002(d) of the Water Resources Reform and Development Act of 2014 (33 U.S.C. 2251), which authorizes the Secretary of the Army, "not less frequently than once every 5 years" and in coordination with the Inland Waterways Users Board (Users Board), to develop and submit to Congress and make publicly available a strategic review of the March 2016 *Inland and Intracoastal Waterways Twenty-Year Capital Investment Strategy* (CIS). The 2020 CIS Report identifies and explains any changes to the project-specific recommendations contained in the March 2016 report (including any changes to the prioritization criteria used to develop the updated recommendations).

What's in This Report?

The 2020 CIS Report documents the resulting work of USACE's CIS project delivery team (PDT) in meeting the requirements to develop a 5-year update. The USACE CIS PDT actively collaborated with industry stakeholders in accordance with Section 302(d) of WRDA 1986, as amended to the maximum possible extent within the provisions of the Federal Advisory Committee Act requirements.

The report is organized as follows:

Section 1, *Overview*: Discusses the USACE CIS PDT coordination with the Users Board during the process.

Section 2, *Strategic Review and Update*: Discusses strategic review and updates.

Section 3, *CIS Ranking Methodology*: Details the methodology used to further advances in objective analysis, selection, efficient project sequencing, and scheduling.

Section 4, *Twenty-Year Capital Investment Priorities*: Provides the results and recommendations for the 20 years of inland and intracoastal navigation capital investments.

Section 5, *Proposed Future Improvements*: Discusses proposed future improvements in the CIS process.

Results of the 2016 20-Year CIS

In March 2016, the Assistant Secretary of the Army for Civil Works [ASA (CW)] transmitted to Congress the *Inland and Intracoastal Waterways Twenty-Year Capital Investment Strategy* (2016 CIS Report). The 2016 CIS Report developed a 20-year investment strategy for the inland and intracoastal waterways based on different IWTF funding scenarios and project prioritization criteria. The 2016 Report focused primarily on funding projects under construction. The three scenarios and status of work are shown in Table ES-1.

Table ES-1. 2016 Funding Scenarios and Status of Work

Scenario	Description	Status of Work
Baseline	The Baseline scenario assumes there is limited funding available for the inland navigation construction program, based on estimated amounts typically found in the President's Budget. This scenario identified projects and funding for fiscal year (FY) 2016 to FY 2021 and total funding amount for FY 2022 to FY 2036.	• Construction of Olmsted Locks & Dam and Locks & Dams 2, 3, and 4, Monongahela River Navigation project (also known as Lower Monongahela) have been funded to completion. • Construction of Kentucky Lock Addition and Chickamauga Lock are ongoing. • LaGrange Lock & Dam (L&D) major rehabilitation is funded to completion. • Brandon Road Lock & Dam major rehabilitation report has not been funded, and therefore, no work has been accomplished.
Annual Allocation	The Annual Allocation scenario assumes that additional appropriations continue to be provided in a funding pot. This scenario identified projects and funding for FY 2016 to FY 2021 and total funding amount for FY 2022 to FY 2036.	• Construction of Olmsted Locks & Dam and Locks & Dams 2, 3, and 4, Monongahela River Navigation Project have been funded to completion. • Construction of Kentucky Lock Addition and Chickamauga Lock are ongoing. • Gulf Intracoastal Waterway (GIWW), High Island to Brazos

		River is currently in feasibility phase. • LaGrange Lock & Dam major rehabilitation is funded to completion. • Thomas O'Brien Lock & Dam major rehabilitation has not been funded for construction.
Maximized IWTF	The Maximized IWTF scenario assumes there is no limit to the General Treasury funding available to match the IWTF. This scenario identified projects and funding for FY 2016 to FY 2021 and total funding amount for FY 2022 to FY 2036.	• Construction of Olmsted Locks & Dam and Locks & Dams 2, 3, and 4, Monongahela River Navigation Project have been funded to completion. • Construction of Kentucky Lock Addition and Chickamauga Lock are ongoing. • GIWW, High Island to Brazos River is currently in feasibility phase. • LaGrange Lock & Dam major rehabilitation is funded to completion. • Thomas O'Brien Lock & Dam major rehabilitation has not been funded for construction.

2020 Update to the 20-Year CIS

Building upon the initial 20-year CIS report developed in 2016 and incorporating lessons learned, USACE has updated the methodology to evaluate and rank potential projects. The updated 20-year report (2020 CIS Report) includes three revised funding scenarios (Table ES-2) which are intended to illustrate the relationship between available funds and work that can be accomplished. The updated 20-year CIS report was developed based on the USACE capability estimate that it could efficiently and effectively use during the fiscal year for each inland navigation infrastructure study or project. Each project capability estimate is independent and assumes that there are sufficient resources to execute the work.

The summary below references 15 inland waterways projects identified in Section 4.2 Ongoing Construction Projects (Category 1) and Section 4.3 New Start Construction Projects (Category 2).

Table ES-2. 2020 Funding Scenarios

Scenario	Description	Summary
Baseline (revision of the 2016 Baseline scenario)	The Inland Navigation Program (General Treasury and the IWTF) starts at $240 million and grows at 1.5% per year. The cost share is assumed to be 50% General Treasury/50% IWTF throughout the 20 years.	• In the 20 years from FY 2021 to FY 2040, nine construction projects could be completed, and two would be ongoing, for a total of $5.70 billion. • For reference, the 15 projects would be completed by FY 2053 at an estimated cost of $9.23 billion.
Enhanced (revision of the 2016 Annual Allocation scenario)	The Inland Navigation Program is $400 million per year with carryover of funds.	• In the 20 years from FY 2021 to FY 2040, 15 construction projects could be completed by FY 2039 at an estimated cost of $7.80 billion.
10-Year Construction (Revision of 2016 Maximized IWTF scenario)	The Inland Navigation Program funding would be sufficient to complete all projects in 10 years.	• The 15 projects would all be completed by FY 2033 at an estimated cost of $7.05 billion.

The 2020 Capital Investment Strategy Report serves the purpose of Section 302(b) of the Water Resources Development Act of 1986 (WRDA 1986) as amended by Section 2002(d) of the Water Resources Reform and Development Act of 2014 (33 U.S.C. 2251). The 2020 Capital Investment Strategy Report is a planning framework and does not take the place of the normal budget processes or represent a commitment by the Administration to budget the amounts shown. The information and findings in this report represent those of the U.S. Army and the U.S. Army Corps of Engineers.

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1. Overview

The U.S. Army Corps of Engineers (USACE) developed and maintains approximately 12,000 miles of inland and intracoastal waterways known as the Inland Marine Transportation System (IMTS). This network includes nearly 11,000 miles of the "fuel taxed waterways" (FTW), as shown in Figure 1. USACE built a majority of the Nation's locks and dams in the early 20th century with an overall average age of 71 years old. The FTW includes 209 lock chambers (at 167 sites) on 27 inland rivers and intracoastal waterways segments (Appendix C). Commercial operators on the designated fuel taxed waterways pay a fuel tax of $0.29 per gallon, which is deposited into the Inland Waterways Trust Fund (IWTF). The IWTF typically pays half the cost for new construction and major rehabilitation on the inland and intracoastal waterways.

Figure 1. The Fuel Taxed Inland and Intracoastal Waterways

Base Map Source: ESRI ArcGIS Major Rivers Layer

USACE's challenge in the 21st century is to maintain the reliability of the Nation's locks and dams within the federal budget. This task involves operating and maintaining the aging locks and dams while planning for strategic modernization and recapitalization. USACE continues to apply objective, risk-informed, life-cycle asset management approaches to developing a national investment strategy that prioritizes investments in the Nation's inland and intracoastal waterways. This optimizes investment decisions while minimizing construction delays and cost increases.

1.1 Report Purpose

The December 2020 *Inland and Intracoastal Waterways Twenty-Year Capital Investment Strategy* (2020 CIS Report) was prepared in response to Section 302(b) of the Water Resources Development Act of 1986 (WRDA 1986), as amended, and provides a review and update of the March 2016 *Inland and Intracoastal Waterways Twenty-Year Capital Investment Strategy* (CIS). The 2020 CIS Report focuses on capital investment in existing projects (e.g., lock extensions) and major rehabilitation of existing projects. It identifies and explains changes to the project-specific recommendations contained in the March 2016 report (including any changes to the prioritization criteria used to develop the updated recommendations).

1.2 2010 Capital Projects Business Model Final Report

The IMTS Capital Projects Business Model (CPBM) Final Report, dated April 13, 2010, was a collaborative effort between the inland navigation (INAV) industry and USACE to identify solutions for managing a nationwide portfolio of INAV assets and the investments needed to maintain those assets. This report can be found online at https://www.iwr.usace.army.mil/Portals/70/docs/Wood_doc/IMTS_Final_Report_13_April_2010_Rev_1.pdf.

1.3 2014 WRRDA Legislation

The Water Resource and Reform Development Act of 2014 (WRRDA 2014) in Title II, Subtitle A, Section 2002, (d) amended Section 302 of Water Resources Development Act of 1986 (WRDA 1986) directs USACE to develop a report, in coordination with the Inland Waterways Users Board (Users Board) for a 20-year program of prioritized inland and intracoastal waterways capital investment. Section 302(d) of WRDA 1986, as amended authorizes this report and states:

> "(d) CAPITAL INVESTMENT PROGRAM
>
> (1) IN GENERAL. Not later than 1 year after the date of enactment of this subsection, the Secretary, in coordination with the Users Board, shall develop and submit to Congress a report describing a 20-year program for making capital investments on the inland and intracoastal waterways based on the application of objective, national project selection prioritization criteria.
>
> (2) CONSIDERATION. In developing the program under paragraph (1), the Secretary shall take into consideration the 20-year capital investment strategy contained in the Inland Marine Transportation System (IMTS) Capital Projects Business Model, Final Report published on April 13, 2010, as approved by the Users Board.
>
> (3) CRITERIA. In developing the plan and prioritization criteria under paragraph (1), the Secretary shall ensure, to the maximum extent practicable, that investments made under the 20-year program described in paragraph (1)—
>
> (A) are made in all geographical areas of the inland waterways system; and
>
> (B) ensure efficient funding of inland waterways projects.

(4) STRATEGIC REVIEW AND UPDATE. Not later than 5 years after the date of enactment of this subsection, and not less frequently than once every 5 years thereafter, the Secretary, in coordination with the Users Board, shall—

(A) submit to Congress and make publicly available a strategic review of the 20-year program in effect under this subsection, which shall identify and explain any changes to the project-specific recommendations contained in the previous 20-year program (including any changes to the prioritization criteria used to develop the updated recommendations); and

(B) make revisions to the program, as appropriate."

1.4 2016 Inland and Intracoastal 20-Year CIS Report (2016 CIS Report)

In 2016, the Assistant Secretary of the Army for Civil Works [ASA (CW)] transmitted to Congress a follow-up to the 2010 CPBM Report titled *Inland and Intracoastal Waterways Twenty-Year Capital Investment Strategy* (2016 CIS Report), which documented work by USACE's Investment Program Action Team (IPAT). The 2016 CIS Report developed a 20-year investment strategy for the inland and intracoastal waterways based on different IWTF funding scenarios and project prioritization criteria. The 2016 CIS Report was prepared in coordination with the Users Board and consistent with the Section 302(d) of WRDA 1986 as amended requirements. The report, built off the 2010 IMTS CPBM Report, described the processes used for updating the CIS and identified future improvement actions that could be implemented. The 2016 CIS Report can be found online at https://www.iwr.usace.army.mil/Portals/70/docs/IWUB/WRRDA_2014_Capital_Investment_Strategy_Final_31Mar16.pdf.

The 2016 CIS Report prioritized the ongoing new construction projects for FY 2016 through FY 2021 in the following order: Olmsted Locks and Dam; Locks & Dams 2, 3, and 4, Monongahela River Navigation Project; Kentucky Lock Addition; and Chickamauga Lock. The 2016 CIS Report also identified potential new construction projects for consideration for FY 2022 through FY 2036 in alphabetical order. The LaGrange Lock & Dam and Thomas O'Brien major rehabilitation projects were prioritized for FY 2016 through FY 2021. The report listed several potential major rehabilitation projects for consideration for FY 2022 through FY 2036 in alphabetical order. The 2016 CIS Report had three scenarios titled Baseline, Annual Allocation, and Maximized IWTF, which are described on pages 28 to 30 in the 2016 CIS report.

1.4.1 Status of projects identified in 2016 CIS.

The status of the projects included in the 2016 CIS Report follows:

- Olmsted Locks & Dam project and Locks & Dams 2, 3, and 4, Monongahela River Navigation Project (also known as Lower Monongahela) have been funded to completion, and construction is ongoing.
- Kentucky Lock Addition and Chickamauga Lock projects have received funding in each year, and construction is ongoing.
- LaGrange Lock & Dam major rehabilitation project has been funded to completion, and construction is ongoing.

Table 1 shows the President's Budget and Total Allocations for inland waterway construction projects for FY 2016 to FY 2021.

Table 1. IWTF Projects: President's Budget and Total Allocation (Thousands)

Project	Funding Item	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021
Olmsted	President's Budget	$180,000	$225,000	$175,000	$35,000	$0	$0
	Total Allocation	$268,000	$250,000	$175,000	$50,000	$63,000	TBD
Lower Mon	President's Budget	$52,000	$0	$0	$0	$111,000	$0
	Total Allocation	$58,900	$82,010	$98,000	$89,000	$111,000	TBD
Emsworth	President's Budget	$0	$0	$0	$0	$0	$0
	Total Allocation	$0	$1,000	$0	$0	$0	TBD
Kentucky	President's Budget	$0	$0	$0	$0	$0	$0
	Total Allocation	$45,700	$36,000	$39,500	$43,600	$61,060	TBD
Chickamauga	President's Budget	$0	$0	$0	$0	$0	$0
	Total Allocation	$29,600	$40,000	$76,500	$89,700	$101,700	TBD
LaGrange	President's Budget	$0	$0	$0	$0	$0	$0
	Total Allocation	$0	$0	$10,000	$57,500	$0	TBD
TOTAL	**President's Budget**	**$232,000**	**$225,000**	**$175,000**	**$35,000**	**$111,000**	**$0**
	Total Allocation	**$402,200**	**$409,010**	**$399,000**	**$329,800**	**$335,760**	**TBD**

1.5 Key Updates Since the 2016 CIS Report

Since the 2016 CIS Report to Congress, there have been many significant events. In FY 2017, Congress funded the Emsworth Locks & Dam, Ohio River, Pennsylvania project to completion. Olmsted Locks & Dam opened to commercial traffic on August 29, 2018, officially replacing the Ohio River Locks & Dams 52 and 53. The LaGrange Lock & Dam, major rehabilitation project was funded to completion in FY 2019. In FY 2020, Congress funded the Olmsted Locks & Dam project and Locks & Dams 2, 3, and 4, Monongahela River Navigation Project to completion as well as funding the ongoing construction at Kentucky Lock Addition and Chickamauga Lock projects. Kentucky Lock Addition and Chickamauga Lock projects are making significant construction progress and will be completed in the next several years assuming the current funding trend continues. The Upper Mississippi River (UMR) and Illinois Waterway (IWW) Navigation and Ecosystem Sustainability Project (NESP) Economic Evaluation Report and the Upper Ohio River Navigation Study Economic Evaluation Report were transmitted to the Office of Management and Budget in FY 2020. In addition, Congress included special legislation for the Chickamauga Lock project in the FY 2019 appropriations act to reduce the IWTF share from 50 percent General Treasury/50 percent IWTF to 85 percent General Treasury/15 percent IWTF and then in the FY 2020 appropriations act to maintain a reduced IWTF share at 65 percent General Treasury/35 percent IWTF.

Since the 2016 CIS Report, no new major rehabilitation reports (MRRs) have been completed or approved. Several USACE districts, including Rock Island, St. Louis, Huntington, and Portland, have started MRRs on various projects, but at the time of this CIS report, none have been completed. Congress funded two new major rehabilitation studies in FY 2020 – the McClellan-Kerr Arkansas River Navigation System (MKARNS), David D. Terry Lock (No. 6), Arkansas project, and the Kanawha River,

Winfield Locks & Dam, West Virginia project. The FY 2021 Budget includes $2 million to initiate four additional inland waterway project major rehabilitation studies for the Mississippi River, Lock & Dam 18 project and three projects on the Illinois Waterway – Brandon Road Lock & Dam, Illinois, Dresden Island Lock & Dam, Illinois; and Starved Rock Lock & Dam, Illinois. Current policy states that any economically justified major rehabilitation project take at least two years to complete and has a capital cost that exceeds the threshold and therefore can be funded in the Construction account and cost shared with the IWTF.

1.6 Current State of the Waterways Infrastructure

USACE built a majority of the Nation's locks and dams in the early 20th century, and more than 70 percent of the lock chambers are over 50 years old, with an overall average age of 71 years old. While the infrastructure continues to age and deteriorate, USACE is working to maintain the system reliability. The USACE Asset Management Program is targeting critical maintenance work to ensure the highest risk repairs receive operation & maintenance (O&M) funding, which is approximately $700 million annually. The productive service life of approximately 40 lock and dam projects have been extended through major rehabilitations. The result is that the various major rehabilitations have kept the system generally available and reliable.

Locks and dams in poor condition are more susceptible to mechanical failures, resulting in increased scheduled and unscheduled closures or stoppages needed to perform maintenance and repairs. This in turn causes delays, increased congestion, and costs of transporting waterborne commodities.

USACE continues to proactively schedule lock stoppages for maintenance (Figure 2), and the occurrence of unscheduled mechanical closures has generally decreased since FY 2011 (Figure 3).

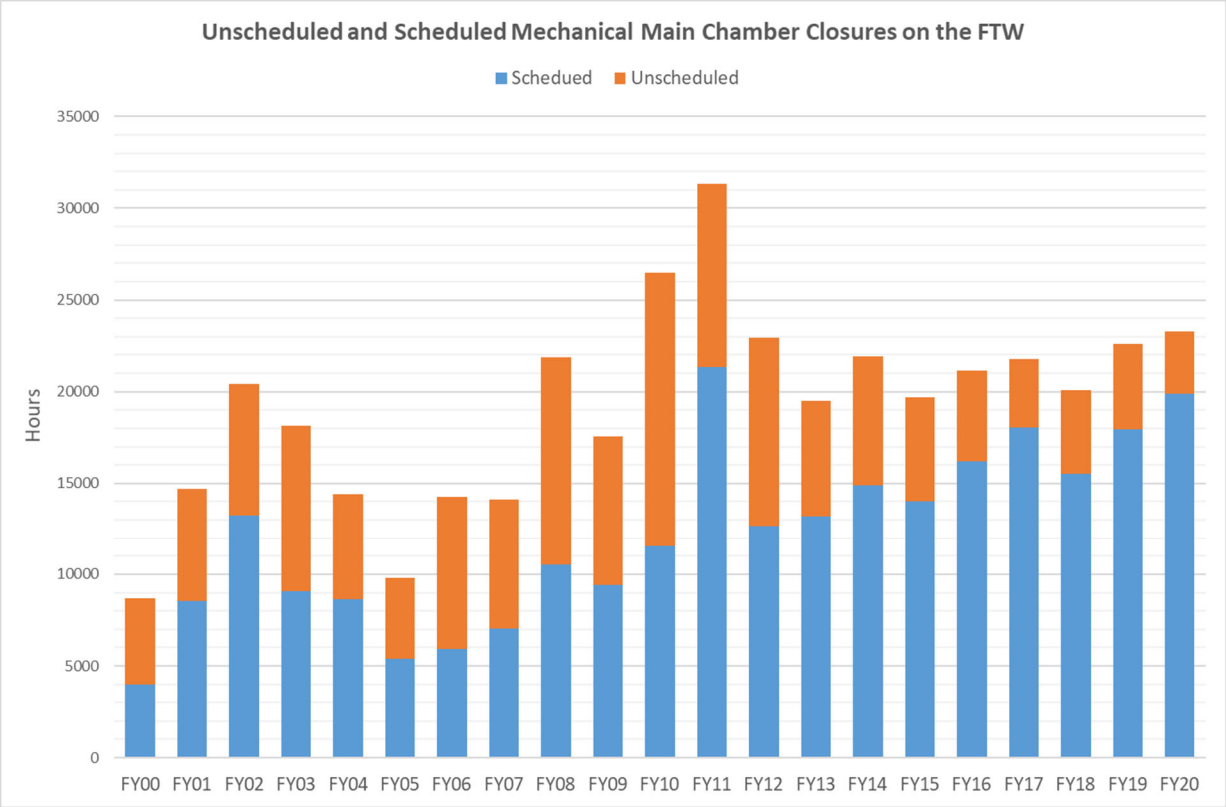

Figure 2. Duration of Unscheduled and Scheduled Mechanical Main Lock Chamber Closure from FY 2000 to FY 2019 on Fuel Taxed Waterways

Unscheduled stoppages are especially costly to both vessel operators and USACE. Vessel operators are unable to anticipate and minimize the costs of these incidents, and USACE project operations staff must determine what to repair and what repairs to defer, which can increase future costs of repair. Figure 3 depicts unscheduled mechanical closures since FY 2000. As a part of its Civil Works Strategic Plan, USACE is striving to reduce the instances where mechanically driven failures at locks result in delays of more than one day and delays of more than seven days. It should be noted that this metric relates only to the main chamber. For instances such as the extended unavailability for the Mel Price and the Dashields L&D where a redundant auxiliary chamber exists, longer processing times are normally required and may often cause delays; however, the waterway traffic is not completely shut down.

Learning from the Columbia-Snake rivers segment-wide risk reduction and scheduled closures, USACE is proactively partnering with industry to jointly minimize the impacts of the scheduled unavailability. One example of proactive partnering is the summer 2020 Illinois Waterway closure with six locks closed simultaneously for maintenance and repair work.

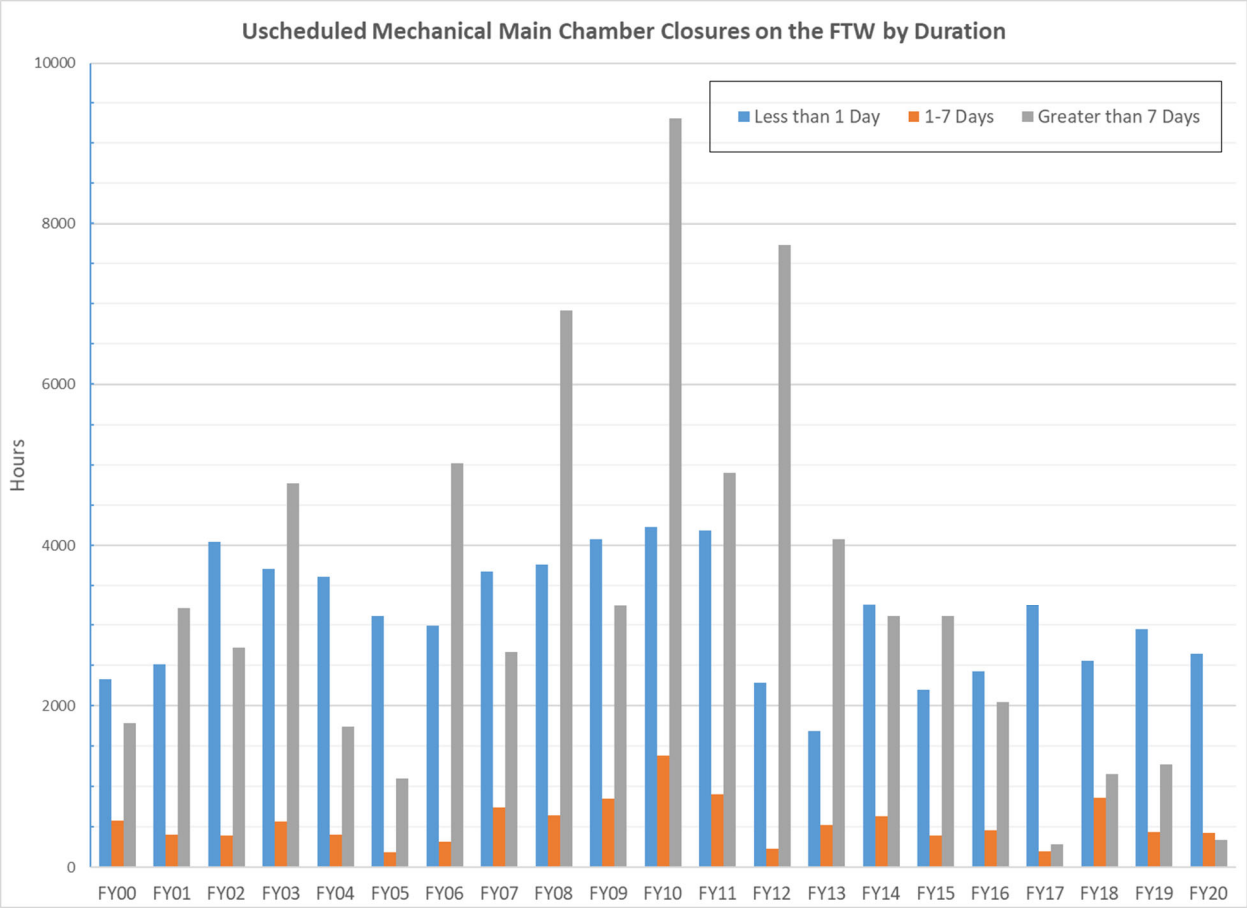

Figure 3. Durations of Unscheduled Mechanical Main Lock Chamber Closure from FY 2000 to FY 2019 on Fuel Taxed Waterways

1.7 Inland Waterways Trust Fund (IWTF)

Congress authorized the IWTF by two separate acts. The original authorization was contained in the Inland Waterways Revenue Act of 1978 (Public Law 95–502, October 21, 1978, Sec. 1801 et seq.; hereinafter, the "1978 Revenue Act"). Under the 1978 Revenue Act, Congress created the IWTF for the purpose of "making construction and rehabilitation expenditures for navigation on the inland and intracoastal waterways of the United States," as provided in appropriations acts. Congress funded the IWTF with a "tax on fuel used in commercial transportation on inland waterways."

WRDA 1986 reauthorized the IWTF and made clear that "the Inland Waterways Trust Fund established by shall be treated for all purposes of law as a continuation of the Inland Waterways Trust Fund established by…the Inland Waterways Revenue Act of 1978." WRDA 1986 specifically authorized the construction of eight inland waterways modernization projects. Instead of establishing a fixed cost sharing formula applicable to all inland waterways construction projects, WRDA 1986 established fixed construction financing requirements for the eight inland waterways modernization projects specifically authorized in WRDA 1986 only, providing for those specific projects that "one-half of (construction) costs shall be paid only from amounts appropriated from the IWTF." In every subsequent post-1986 WRDA authorizing additional new construction projects on the inland and intracoastal waterways, Congress

followed the 50 percent/50 percent financing precedent established in WRDA 1986. Although authorized with 50 percent /50 percent financing, WRRDA 2014 reduced the IWTF share for the Olmsted Locks & Dam project to 85 percent General Treasury/15 percent IWTF.

Table 2 shows the diesel fuel tax history. The diesel fuel tax started on October 1, 1980 at $0.04 per gallon and increased in accordance with legislation. From 1995 to March 31, 2015, the diesel fuel tax was $0.20 per gallon. The Achieving a Better Life Experience Act of 2014 increased the diesel fuel tax rate to $0.29 per gallon effective April 1, 2015.

Table 2. Inland Waterways Fuel Tax Rates, 1980 to 2020

If Fuel Use Occurs:	The Tax per Gallon Is:	In 2019 Dollars
After September 30, 1980	$0.04	$0.10
After September 30, 1981	$0.06	$0.13
After September 30, 1983	$0.08	$0.17
After September 30, 1985	$0.10	$0.19
During 1990	$0.11	$0.19
During 1991	$0.13	$0.22
During 1992	$0.15	$0.25
During 1993	$0.17	$0.28
During 1994	$0.19	$0.30
1995 to March 31, 2015	$0.20	$0.26 (avg)
April 1, 2015 to Present	$0.29	$0.30

The IWTF was physically established in February 1981, with the transfer of $10 million in estimated diesel fuel tax revenues. According to the Treasury Department statement for September 30, 2020, the balance of the IWTF at the end of FY 2020 was approximately $131 million. Table 3 shows a historical summary of the IWTF from the Treasury statements.

Table 3. IWTF Cash Flow, 1987–2020 in $Millions (Nominal)

FY	Transfers	Tax Revenues	Interest Earnings	Total Revenues + Interest	Year-End Balances [1]
1987	$(24.50)	$48.30	$16.50	$64.80	$300.60
1988	$(62.10)	$48.10	$24.30	$72.40	$310.80
1989	$(62.80)	$47.00	$26.00	$73.00	$321.10
1990	$(117.30)	$62.80	$26.20	$89.00	$292.80
1991	$(148.60)	$60.50	$21.20	$81.70	$225.90
1992	$(122.70)	$69.90	$13.70	$83.60	$186.70
1993	$(74.50)	$78.60	$7.50	$86.10	$198.30
1994	$(75.70)	$88.40	$9.30	$97.70	$220.20
1995	$(94.80)	$103.40	$13.30	$116.70	$242.10
1996	$(85.50)	$108.40	$15.60	$124.00	$280.60
1997	$(89.50)	$96.40	$17.00	$113.40	$304.60
1998	$(76.90)	$91.10	$18.30	$109.40	$337.09
1999	$(88.24)	$104.37	$17.41	$121.78	$370.63
2000	$(102.38)	$99.58	$19.96	$119.54	$387.79
2001	$(110.22)	$112.68	$20.90	$133.58	$411.15
2002	$(104.49)	$95.28	$12.40	$107.68	$412.64
2003	$(101.55)	$89.52	$9.52	$99.04	$399.02
2004	$(117.26)	$90.85	$6.91	$97.76	$382.03
2005	$(136.32)	$91.29	$7.66	$98.95	$352.60
2006	$(183.87)	$80.81	$9.37	$90.18	$267.67
2007	$(204.87)	$91.10	$10.38	$101.48	$137.66
2008	$(202.16)	$87.60	$4.78	$92.38	$27.48
2009	$(90.00)	$75.95	$0.82	$76.77	$14.25
2010	$(50.13)	$73.95	$0.15	$74.10	$38.21
2011	$(90.32)	$83.95	$0.05	$84.00	$31.90
2012	$(88.70)	$89.20	$0.04	$89.24	$45.90
2013	$(87.27)	$75.11	$0.04	$75.15	$33.82
2014	$(97.87)	$81.73	$0.02	$81.75	$24.66
2015	$(68.34)	$97.89	$0.01	$97.90	$54.22
2016	$(108.00)	$110.90	$0.23	$111.13	$57.35
2017	$(108.36)	$113.73	$0.68	$114.40	$63.40
2018	$(49.27)	$115.00	$1.81	$116.81	$130.93
2019	$(183.22)	$117.05	$4.20	$121.25	$68.96
2020	$(50.04)	$111.69	$0.69	$112.38	$131.30

[1] Year-end balances are from the U.S. Treasury and include U.S. Treasury adjustments not reflected in the table.

2. Strategic Review and Update

The 2020 CIS Report was prepared under Section 302(b) of the Water Resources Development Act of 1986 (WRDA 1986) as amended by Section 2002(d) of the Water Resources Reform and Development Act of 2014 (33 U.S.C. 2251), which authorizes the Secretary of the Army, "and not less frequently than once every 5 years" and in coordination with the Inland Waterways Users Board (Users Board), to develop and submit to Congress and make publicly available a report strategic review" of the March 2016 *Inland and Intracoastal Waterways Twenty-Year Capital Investment Strategy* (CIS). The 2020 CIS Report identifies and explains any changes to the project-specific recommendations contained in the March 2016 report (including any changes to the prioritization criteria used to develop the updated recommendations).

2.1 Scope, Assumptions, Limitations, and Process of Formulation for the 2020 CIS Report

The process for performing this strategic review and update generally followed the steps and concepts used in the 2016 CIS Report, while at the same time identifying lessons learned that need to be incorporated into the overall strategy. The steps for the review and report include:

- Establish the team.
- Engage the field and solicit their bottom-up insights into possible projects for inclusion.
- Filter and categorize potential projects following process in Figure 4.
- Analyze the portfolio using weighted analysis for authorized projects described in Section 3.
- Compare, contrast, and reconcile the projects identified following the Section 3 methodology with those submitted by the field (bottom-up).
- Incorporate additional factors including scheduling logistics, geographic distribution of projects, and expert elicitation.
- Proactively engage navigation stakeholders to solicit their insights and feedback on those specific projects as well as the broader system.
- Concurrent with all of the above, identify lessons learned and apply as needed.

The USACE 2020 CIS project delivery team (PDT) was officially formed in January 2019 by the HQUSACE Chief of Operations and Regulatory. The PDT is comprised of USACE staff who worked in coordination with the Inland Waterways Users Board in accordance with the provisions of Section 302(d) of WRDA 1986, as amended. The PDT members are listed in Appendix B. The CIS PDT represented a diverse, well-rounded group of navigation experts from the following USACE organizations:

- Civil Works Cost Engineering Center of Expertise
- Great Lakes and Ohio Rivers Division (LRD)
- Headquarters, U.S. Army Corps of Engineers (HQUSACE)

- Inland Navigation Design Center (INDC)
- Institute for Water Resources (IWR)
- Mississippi Valley Division (MVD)
- Northwestern Division (NWD)
- Planning Center of Expertise for Inland Navigation (PCXIN)
- South Atlantic Division (SAD)
- Southwestern Division (SWD)

2.2 Assumptions

This section documents the assumptions used in developing this report. Some of these assumptions were used to simplify the analysis. The planning analysis is intended to inform decision makers about a range of potential scenarios. This report assumes the following:

- The 2020 CIS Report is a planning framework and does not take the place of the normal budget processes or represent a commitment by the Administration to budget the amounts shown.
- That current policies and practices will continue within the planning framework of this document (FY 2021 – FY 2040). The 2020 CIS Report assumes therefore that the current (FY 2021) cost sharing of 50 percent General Treasury and 50 percent IWTF will continue through the planning period. However, in accordance with WRRDA 2014, the cost share for the Olmsted Locks & Dam project will remain 85 percent General Treasury and 15 percent IWTF throughout this planning analysis.
- That the IWTF revenue and outlay structure will remain consistent with those figures reflected in Table 3 (Section 1.7). For planning purposes at the time this report was prepared, it was assumed that FY 2021 IWTF receipts will be $118 million and interest income will be $2 million for a total of $120 million. In addition, for planning purposes it was assumed that annual IWTF receipts and interest will grow at 1.5 percent annually throughout this 20-year analysis.
- In order to deliver the best value to the Nation, efficient planning, design, and construction of projects is a key tenet of this report. The planning analysis found in this document assumes sufficient annual appropriations to execute each project in the most cost-effective manner. This is a key assumption to avoid the impacts of incremental funding, which has contributed to increased costs and schedule delays. There are many reports (GAO report 17–147 (February 2017), GAO report 19–20 (November 2018), and Texas A&M Transportation Institute, *Predictable Funding for Locks and Dams* (April 2018)) documenting the impacts of incremental funding on project cost and schedule.
- The funding to design and construct each project is USACE's best estimate at the time of preparation of the report for efficient design and construction. Additionally, it is assumed that the internal and external resources are available to execute the work.
- That the minimum IWTF balance is $20 million and therefore, no construction project will be started if it will result in the IWTF balance dropping below the $20 million minimum.

2.3 Analysis Data Sources

The analysis in this report is based on three primary data sources — the Lock Performance Monitoring System (LPMS), the Operational Condition Assessment (OCA) Database, and the Shipper Carrier Cost (SCC) Model. The analysis in this report is robust using the best available information to develop the 20-year capital investment strategy. USACE is a learning organization and is continually striving to improve the way it collects and analyzes data.

2.4 Stakeholder Coordination

Section 302(d) of WRDA 1986, as amended requires "coordination with the Users Board" in developing the CIS. USACE continues to emphasize the importance of collaborating with industry stakeholders to the maximum possible extent within the provisions of the Federal Advisory Committee Act requirements. Stakeholder engagement and input were sought during report development starting in July 2019.

Ultimately, the criteria, processes, procedures, and results in this CIS reflect the judgment of the Army and USACE.

USACE and CIS PDT members coordinated with industry in the following venues:

USACE Senior Leader Interaction: Meeting with select industry members on a "one-on-one" basis. This approach was used as a briefing opportunity to inform the stakeholders on future USACE plans.

Users Board Briefings: The Users Board and inland waterways interests were briefed on multiple occasions at the regularly scheduled public Users Board meetings. These were formal briefings updating industry on the progress made by the CIS PDT.

Feedback Webinars/Teleconferences: These interactions were scheduled as one-hour meetings to brief the stakeholders on specific topics worked on by the CIS PDT. They also provided an opportunity for industry to provide feedback.

Face-to-Face Meetings: These meetings presented in-depth briefings and provided the opportunity for coordination, collaboration, and feedback. These meetings proved extremely useful in assisting the 2020 CIS PDT with developing the prioritization methodology, project planning, and sequencing.

2.5 Enterprise Approach

This CIS provides nationally-consistent, enterprise-level visibility on project sites where a risk-informed investment approach would focus on critical assets that are in the worst shape/condition, have the highest likelihood of failing, and would cause the highest economic impact on shippers and carriers.

Focusing funds in this manner is expected to increase the availability, reliability, and service life of the key assets, such as a lock or dam, and critical systems like gates and gate-operating machinery.

Once this set of projects/assets with the most exposed risk is identified, USACE can determine how best to allocate resources to address the highest risks using different approaches, including maintenance, a major rehabilitation, or a modernization investment. The requisite analysis and justification for a major

rehabilitation or new project would be accomplished through an appropriate major rehabilitation report or a feasibility study, respectively. Once these detailed studies are complete, the projects are ready to be prioritized in the capital program.

3. CIS Ranking Methodology

3.1 2016 Methodology

The 2016 CIS Report established risk-based methodology to support a national program, removing some of the subjectivity. The tool helped to determine and compare exposure to risk across all project sites in a consistent fashion nationally, enabling USACE to "filter" the infrastructure portfolio down to the projects with the highest benefits for capital investments. For additional information on the 2016 methodology, see Section 3 in the 2016 CIS Report.

3.2 2020 Methodology

The 2020 methodology builds upon the 2016 CIS Report and incorporates lessons learned. This update has a revised methodology depicted in Figure 4 that expands the 2016 process. The update process first filters projects on status (ongoing construction, authorized, ongoing study, or potential project) and then introduces new analysis tools tailored to project status and available information as shown in Table 4. This update uses a weighted analysis process, described in Section 3.3, for ongoing construction projects and projects authorized for construction awaiting new starts. Lastly, this report expands the risk methodology to identify and rank the highest risk projects for future studies in Section 3.4.

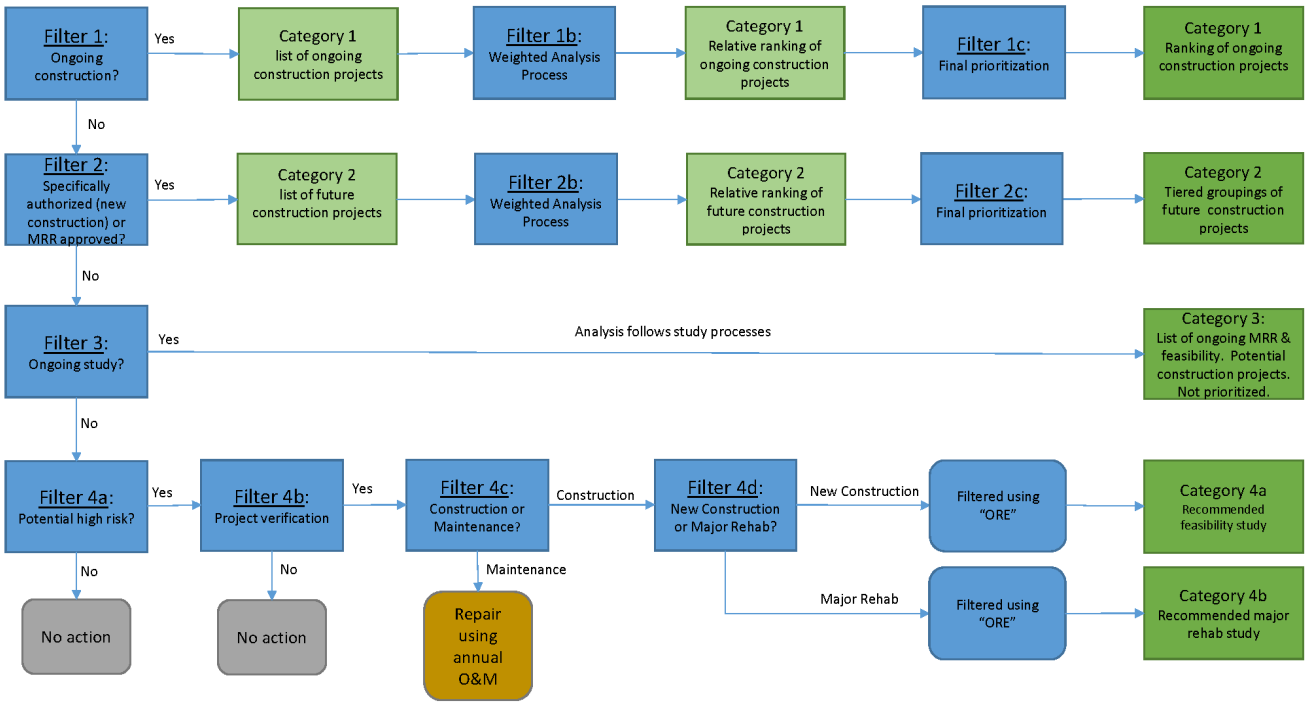

Figure 4. 2020 CIS Filters and Categories

The 2020 CIS Report is a planning framework and does not take the place of the normal budgeting processes or commit the government to future actions. The capability estimates presented in this report represent the funds USACE can efficiently and effectively use during the fiscal year for each inland navigation infrastructure study or project. As discussed in Section 2.2 Assumptions, each capability estimate is independent and assumes that there are sufficient resources to execute the work.

The CIS PDT used multiple analysis tools in ranking future work. Each potential project was put into one of four categories shown in Table 4.

Table 4. Project Categories

Category	Description	Tool
1	Ongoing Construction	Weighted Analysis
2	Authorized and Awaiting Construction Start	Weighted Analysis
3	Ongoing Study	USACE Study Processes
4	Future Potential Projects	Operational Risk Exposure

These categories dictated which analysis was used to assist in ranking. The PDT analyzed projects in Categories 1 and 2 using a weighted analysis, which looked at various attributes such as economics, reliability, condition, and national significance. The PDT then combined the project ratings based on these attributes to assist with ranking. Section 3.4, Future Project Ranking, describes the details of this. The PDT is tracking the status Category 3 studies because these studies may lead to future construction projects. The studies follow the existing USACE planning policies and procedures, and the PDT performed no further analysis. The PDT analyzed Projects in Category 4, Future Potential Projects, using the Operational Risk Exposure (ORE), described in Sections 3.4.1 and 3.4.2.

3.3 Authorized Investment Analysis (Weighted Analysis)

The authorized construction projects in this report are included in Category 1, Ongoing Construction, and Category 2, Authorized and Awaiting Construction Start. These projects have undergone more rigorous study, analysis, and review culminating in their authorization. While there are detailed data available for these potential investment projects, there is still a variety of factors to consider when evaluating the importance or determining a specific funding schedule. Therefore, the CIS PDT looked to develop a more structured analytical process to evaluate the subset of authorized projects. A structured step-by-step process provides greater transparency, an ability to collaborate with stakeholders, and a methodology to factor in multiple varying metrics or attributes.

The resulting structured analytical process breaks down project evaluation into the following steps, (1) Attribute Identification, (2) Data Source Description, (3) National Significance, (4) Attribute Weighting, (5) Rating Metric Identification, (6) Relative Project Rating, and (7) Final Prioritized Project Ranking. These steps are described in detail in the Sections 3.3.1 through 3.3.7.

3.3.1 Attribute Identification

The first step of the structural analytical process is to identify all attributes to consider when making the decision. Attributes should generally represent all important considerations when evaluating potential projects and making the decision. Attributes should be unique in that no two attributes should represent the same factor. The PDT brainstormed and discussed possible attributes and consolidated them into four key categories (Table 5).

When identifying these attributes, the PDT further divided the attributes into sub-attributes for a more inclusive analysis. This allowed consideration of important data sets, opinions, and considerations while still focusing on the handful of key overall attributes that were identified.

Table 5. Attributes and Sub-Attributes

Attribute	Sub-Attribute
1. Economic	1.1. RBRCR (Remaining Benefit to Remaining Cost Ratio) 1.2. BCR (Benefit to Cost Ratio)
2. Reliability and Condition	2.1. Reliability 2.2. Condition
3. Lock Utilization	3.1. Redundancy 3.2. Delays 3.3. Lockages
4. National Significance	N/A

3.3.2 Data Source Description

Input data were queried from various sources to support analysis and are summarized in Table 6**Error! Reference source not found.**. Condition data were queried from the Operational Condition Assessment (OCA) Database. To support the risk exposure calculations, the 2019 economic impacts from the SCC Model were utilized. The PCXIN maintains the SCC, which is updated annually. The probability of failure data for project components was queried from the Operational Risk Assessment (ORA) Database. Data queried for reliability reflect the average annual duration (hours) the lock was out of service due to maintenance of lock or equipment, lock hardware or equipment malfunction, debris clearance, repair of lock or hardware, inspection or testing, lock staff attending to other duties, or ice on lock equipment. The data queried for delays reflect all delays (in hours) regardless of weather or maintenance. Due to inconsistencies with how and why delay is reported, this attribute was left in aggregate form. The data queried for lockages reflect the average number of all lockages per year at each location including commercial and recreation.

Table 6. Data Queried

Metric	Data Source	Query Date	Query Range
Reliability	LPMS	1/14/2020	FY 2009–FY 2019
Condition	OCA Database	1/8/2020	FY 2019
Probability of Failure	ORA Database	1/8/2020	FY 2019
Risk Exposure	SCC Model	1/8/2020	FY 2019

Delays	LPMS	1/14/2020	FY 2009–FY 2019
Lockages	LPMS	1/14/2020	FY 2009–FY 2019

3.3.3 National Significance

While the first three attributes (Economic, Reliability and Condition, and Lock Utilization) are numerical data from existing USACE databases, the National Significance attribute is intended to be a qualitative measure on the importance of the project and the proposed work to the Nation, the national economy, and inland waterways system. It is to ensure that a project of high importance is not excluded from consideration by primary indicators such as tonnage or economic value. The National Significance attribute includes lock and dam sites with strategic cargo transit such as fuel/energy products, rocket and rocket components, nuclear materials, military equipment, and similar. Additionally, it highlights projects important to export of commodities from the energy and agricultural sectors for which the waterways are the most economic mode of transport and therefore provide U.S. producers with competitive advantage in world markets.

This attribute was developed by surveying CIS PDT, Major Subordinate Command (MSC) Operations personnel, and stakeholders. Each person was asked to rank the importance of the project (Table 7). The CIS PDT's responses were averaged and compared with the average of the stakeholder responses to develop a final, overall weight for each project.

Table 7. National Significance Weighting

Importance	Weight
Very High	4
High	3
Moderate	2
Some	1
None	0

3.3.4 Attribute Weighting

Once the attributes are established, the next step of the structured analysis is to establish the weight of each attribute by evaluating the attributes relative to one another, known as a "pairwise analysis." These individual judgments are then mathematically combined to determine a percentage weight for each attribute. The USACE team and stakeholders, discussed in Section 2.4 Stakeholder Coordination, individually conducted a pairwise analysis in October 2019. Stakeholders provided seven responses and USACE team members provided eight responses.

The pairwise analysis is accomplished by comparing individual sets of attributes. For example, Attribute 1 is compared to Attribute 2 to evaluate which is more important to the decision. This comparison is evaluated using a 1–5 rating scale looking at the degree of importance or dominance of one attribute compared to the other. Table 8 shows the scale used in this analysis.

Table 8. Comparison of Attributes

Definition	Degree of Importance	Explanation
Equal Importance	1	Two criteria contribute equally to the goal
Weak Importance of One Over Another	2	Experience and judgment consider one criterion slightly more important than another
Essential or Strong Importance	3	Experience and judgment consider one criterion strongly more important than another
Demonstrated Importance	4	A criterion is considered strongly more important and its dominance demonstrated in practice
Absolute Importance	5	The evidence showing one criterion to be more important than another is of the highest possible order of confirmation

Each CIS PDT member and stakeholder evaluated the pairs of attributes using this 1–5 scale. The less important attribute in each pair was scored a "1," and the more important attribute in each pair was scored a value greater than "1." For example, if Attribute 2 were judged to be "strongly more important" than Attribute 1, then Attribute 1 was scored a "1" and Attribute 2 was scored a "3."

The results of these individual CIS PDT member and stakeholder responses were then combined using matrix mathematics, resulting in the attribute weighting shown in Table 9.

Table 9. Attribute Weighting (Percentage)

Attribute	Attribute Name	Weight
1	Economic	9%
2	Reliability and Condition	38%
3	Lock Utilization	17%
4	National Significance	36%

3.3.5 Rating Metric Identification

This step is to identify a set of rating metrics and scales with which to evaluate each of the potential investment projects relative to the identified attributes. Quantitative data or approved metrics were used when possible. For the more subjective attributes or sub-attributes where quantitative data were not available, a qualitative metric was developed to evaluate the projects. All metrics were quantitative with the exception of Redundancy and National Significance.

Along with identifying these rating metrics, the PDT identified five-point rating scales for each rating metric. Each scale used a common 0–4 rating scale where a 0 rating indicates that there is minimal or no value for the project relative to that attribute, while a 4 rating indicates that the project is very valuable in relation to that attribute. The actual assignment of ratings was completed in the project rating step. The rating metric and scales are shown in the next section.

3.3.6 Relative Project Rating

The project rating step evaluated each of the potential investment projects in relation to each identified attribute or sub-attribute. This rating process utilized the rating metrics and scales identified in the rating metric identification step. For example, a given potential investment project may receive a “3” rating for the Sub-Attribute 1.1, a “4” rating for Sub-Attribute 1.2, a “0” rating for Sub-Attribute 2.1, and so on. These ratings were completed for each attribute and sub-attribute for a given project. This rating process was then repeated for all potential investment projects being considered. Following the assignment of ratings to all projects, the ratings were mathematically combined with the previously determined attribute weights to calculate an overall project weighted score.

Table 10. Weighted Scores

Attribute	Sub-Attribute/Metric	Metric Description	Rating Scale
1. Economic	1.1 RBRCR	Remaining Benefit to Remaining Cost Ratio	4: RBRCR > 2.5 3: (2.0 – 2.5) 2: (1.5 – 2.0) 1: (1.0 – 1.5) 0: 1.0 or less
	1.2 BCR	Benefit to Cost Ratio	
2. Reliability and Condition	2.1 Reliability	Average number of closure days per year for maintenance (scheduled & unscheduled) over the last 10 years	4: 400 or more 3: 400 – 300 2: 300 – 200 1: 200 – 100 0: 100 or less
	2.2 Condition	Based on OCA [1] Data	4: 16 and greater 3: 2 – 16 2: 8 – 12 1: 4 – 8 0: 0 – 4
3. Lock Utilization	3.1 Redundancy	Categories of Redundancy	4: No redundancy 3: Alternate route 2: 2nd small chamber (closed) 1: 2nd small chamber (passes commercial traffic) 0: 2nd full-sized chamber
	3.2 Delays	LPMS Data	4: 4,000 or more 3: 4,000 – 3,000 2: 3,000 – 2,000 1: 2,000 – 1,000 0: 1,000 or less
	3.3 Lockages	LPMS Data	4: 8,000 or more 3: 8,000 – 6,000 2: 6,000 – 4,000 1: 4,000 – 2,000 0: 2,000 or less
4. National Significance	4.1 National Significance	Degree of National Significance	4: Very High 3: High 2: Moderate 1: Some 0: None

[1] OCA data were used to obtain the metric by multiplying the probability of failure P(f) by the recovery duration (days) for each project's lock components that drive risk, and then adding the total sum.

3.3.7 Final Prioritized Project Ranking

The process described in Sections 3.3.1 to 3.3.6 provided initial steps to produce a relative ranking of potential projects. The final step is to produce a prioritized ranking following the "traditional" methodology of categorize, filter, and prioritize. In this final step, the USACE team considered additional information such as geographic distribution of projects, project outputs and inputs, scheduling logistics, and funding constraints to develop a final prioritization. The geographic distribution of projects in accordance with the Section 302(d) 3(A) of WRDA 1986, as amended, which requires investments "are made in all geographical areas of the inland waterways system" was an important consideration. The team sought to balance the distribution and timing of projects to meet the legislative intent. Lastly, the team recognized that many projects had very close priorities that made definitive rankings problematic and therefore, the final prioritization are grouped into "tiers" of similar priority. The projects in each tier have similar priority for execution.

3.4 Future Project Ranking

This section describes the process for ranking Category 4 (Future Potential Projects). The evaluation used a risk-informed process to identify and rank potential future projects. It is important to note that these potential future projects will require study and authorization prior to construction. For the projects that are not authorized and likely do not have data such as BCR, risk exposure was evaluated to formulate a relative priority.

3.4.1 Operational Condition Assessment

The first step in determining Operational Risk Exposure (ORE) is to determine the condition of the components within the navigation portfolio. Operational Condition Assessments (OCAs) were performed for over 166,000 navigation lock and dam components by the end of 2010, where each component is graded with a standard OCA rating scale. The standard OCA rating scale is A (Excellent), B (Good), C (Fair), D (Poor), F (Failing), and CF (Completely Failed). OCAs continue to be performed on a periodic basis and when components are repaired or replaced or experience a significant change in condition. The current approved OCAs were utilized to develop the ORE, which is defined in the next section.

3.4.2 Operational Risk Exposure

The ORE process uses OCA rating data, failure probabilities, and economic data for mission-critical lock components to develop the Category 4 project ranking. The first step developed a list of mission-critical components for locking based on expert elicitation. Next, the list of mission critical components was filtered to identify those components that had OCA conditions "C" through "CF" and recovery durations of five days or greater. The next step computed the risk exposure for each component by multiplying the probability of failure (P(f)) by the economic consequence. The last step is to determine the ORE for a project by adding the risk exposure of each mission critical component.

3.4.3 Expert Elicitation

The process described above produced a relative ranking that was used as an initial screening step. The team members further evaluated the outputs and inputs, and additional project data, to validate the prioritization.

3.4.4 Additional Filtering

The results of the steps described in Sections 3.3.2 and 3.3.3 were further filtered to develop a final ranking. The first filter applied to the results of Category 4 projects was whether the project was determined to be an organizational priority based upon feedback from the respective MSC. Second, only projects that operate and are included within the fuel taxed waterways were considered. Finally, the CIS team determined that only lock wall and lock gate components were considered as capital investment elements; all other components were filtered out and considered maintenance.

4. Twenty-Year Capital Investment Priorities

The 2020 CIS Report focuses on the highest priority inland waterways infrastructure investments for FYs 2021–2040. Any funding shown for a fiscal year (October 1 – September 30) is only notional, representing approximate funding levels that would be needed to sustain the work for any particular fiscal year.

4.1 Recommendations

USACE recommends continued funding for the ongoing construction projects in Category 1 (Table 11) to ensure completion as soon as possible. In addition, design funding is recommended for the Category 2, Tier A projects (Table 12) — NESP Mississippi River L&D 25; Three Rivers, Arkansas; Ohio River Montgomery L&D, and NESP IWW LaGrange L&D — to be ready for a potential construction start.

4.2 Ongoing Construction Projects (Category 1)

Currently, there are four ongoing construction projects in various stages of completion. As determined by the methodology in Section 3, these are scheduled by priority order, and assuming current appropriation trends continue, all ongoing construction projects will be completed in 2025 (Table 11).

Table 11. Category 1, Ongoing Construction Projects

Title	Location	State	Remaining Cost ($K) After FY 2020
Olmsted Locks & Dam	Ohio River	IL	Funded to Completion
Locks & Dams 2, 3, and 4, Monongahela River Navigation Project	Monongahela River	PA	Funded to Completion
Kentucky Lock Addition	Tennessee River	KY	$562.1
Chickamauga Lock	Tennessee River	TN	$230.3

Note: Remaining costs for Kentucky Lock Addition and Chickamauga Lock are based on information presented at Inland Waterways Users Board Meeting #95 on October 30, 2020.

4.3 New Start Construction Projects (Category 2)

Following the methodology in Section 3, the priority list of potential new construction projects and major rehabilitation projects for consideration are listed in Table 12. The projects are organized into groups of projects with similar priority based on the analysis described in Section 3. The projects are listed according to the construction funding scenarios discussed in Section 4.6, and do not indicate project priority within that group.

Table 12. Category 2, New Start Construction Projects

Tier	Project Title	Project Location	State(s)	Fully Funded Cost ($K)
A	UMR-IWW System NESP	L&D 25 (Mississippi River)	MO/IL	$626,024
	Three Rivers	MKARNS	AR	$201,652
	Upper Ohio Navigation Locks & Dams Improvements	Montgomery Locks & Dam	PA	$677,570
	UMR-IWW System NESP	LaGrange L&D (IWW)	IL	$507,433
B	UMR-IWW System NESP	L&D 24 (Mississippi River)	MO/IL	$686,083
	MKARNS 12 ft. Channel	MKARNS		$234,428
	Upper Ohio Navigation Locks & Dams Improvements	Emsworth Locks & Dam	PA	$463,180
	UMR-IWW System NESP	L&D 22 (Mississippi River)	MO/ IL	$578,532
C	UMR-IWW System NESP	L&D 21 (Mississippi River)	IL	$749,869
	Upper Ohio Navigation Locks & Dams Improvements	Dashields Locks & Dam	PA	$454,738
	UMR-IWW System NESP	Peoria L&D (IWW)	MO	$547,838
D	UMR-IWW System NESP	L&D 20 (Mississippi River)	MO	$496,502
	Thomas O'Brien L&D Major Rehabilitation	IWW	IL	$53,000

4.4 Ongoing Studies (Category 3)

Table 13 lists projects in the study phase; the projects are not in priority order. The projects may be in either active study phase or completed and awaiting WRDA authorization. Note that, while authorized, some projects may require additional study due to a change in scope or an update to key study elements such as economic analysis.

Table 13. Category 3, Ongoing Studies

Project Title	Project Location	Status
Bayou Sorrel Lock	Gulf Intracoastal Waterway (GIWW)	Inactive study. Need to re-initiate study – benefits need to be re-evaluated using current waterborne data.
Calcasieu Lock	GIWW	Study closed due to lack of benefits. No further action planned.
GIWW, Colorado River Locks and Brazos River Floodgates	GIWW	Study complete – awaiting WRDA construction authorization.
GIWW, High Island to Brazos River, TX	GIWW	Study ongoing. Based on draft report PACR required in 2021.
GIWW, Port O'Connor to Corpus Christi Bay, TX	GIWW	Study closed. No further action planned.
GIWW Coastal Resiliency Study, TX	GIWW	New study. Fully funded in FY 2020.
Inner Harbor Navigation Canal Lock	New Orleans, LA	Study ongoing – additional work required to address review comments. Revised scheduled completion in 2022.
Winfield Lock & Dam	Kanawha River	Ongoing MRR study.
David D. Terry L&D (No. 6)	MKARNS	Ongoing MRR study.
Starved Rock L&D	Illinois Waterway	MRR study initiated.
Brandon Road L&D	Illinois Waterway	MRR study initiated.
Dresden Island L&D	Illinois Waterway	MRR study initiated.
Lock & Dam 18	Upper Mississippi River	MRR study initiated.

4.5 Future Potential Projects (Category 4)

The methodology described in Section 3.4 (Future Project Ranking) was used to prioritize potential new studies. The lock risk exposure represents critical lock components that could potentially justify a capital investment for a major rehabilitation, including gates and lock walls. In the risk exposure analysis, the lock wall components are the largest risk driver. Some components inputs were modified to better represent site conditions. For example, in a project with duel chambers with shared middle walls, the SCC inputs were increased, thus increasing the risk exposure. Table 14 shows potential projects for consideration for O&M funding to prepare a major rehabilitation report in FY 2022 through FY 2025 listed in order of precedence.

Table 14. Category 4, Future Potential Projects

Program Name	Project Name	CIS Site Name
Ohio River Locks & Dams, WV, KY & OH	Ohio River Locks & Dams	Greenup Lock
IWW, IL & IN	IWW, IL and IN	Starved Rock Lock
MKARNS, AR	MKARNS	Ozark-Jeta Taylor L&D
MKARNS, AR	MKARNS	Webbers Falls L&D
Ohio River Locks & Dams, PA, OH & WV	Ohio River Locks & Dams	Pike Island Locks & Dam
Mississippi River Between Missouri River and Minneapolis	Mississippi River Between Missouri River and Minneapolis	Melvin Price Locks & Dam
MKARNS, AR	MKARNS	Lock No. 2 & Mills Dam
MKARNS, OK	MKARNS	Robert S. Kerr L&D
Ohio River Locks & Dams, WV, KY & OH	Ohio River Locks & Dams	Meldahl Locks & Dam
IWW, IL & IN	IWW, IL and IN	Dresden Island Lock
Monongahela River, PA		Braddock L&D
Ohio River Locks & Dams, PA, OH & WV	Ohio River Locks & Dams	New Cumberland Locks
Ohio River Locks & Dams, WV, KY & OH	Ohio River Locks & Dams	Racine Locks
Ohio River Locks & Dams, WV, KY & OH	Ohio River Locks & Dams	Belleville Locks
Ohio River Locks & Dams, WV, KY & OH	Ohio River Locks & Dams	Willow Island Lock
Kanawha River Locks & Dams, WV	Kanawha River Locks & Dams	London Lock
Kanawha River Locks & Dams, WV	Kanawha River Locks & Dams	Marmet Dam
Ohio River Locks & Dams, PA, OH & WV	Ohio River Locks & Dams	Hannibal Locks

Table 14 prioritization is an all-inclusive listing of Category 4 components that meet the filters described in Section 3.4. This is a revision from the 2016 CIS Report, which further refined the list of projects to a subset of six projects. Dardanelle Lock & Dam was listed as a priority in 2016 yet is not listed in Table 14 since SWD did not list it as such for this update.

4.6 Efficient Construction Scenarios

The CIS depends on available funding to invest in the inland waterways. The program funding is variable and dependent on the tax receipts going into the IWTF and the annual appropriations. The evaluation includes developing three different funding scenarios, considering program variables. These three scenarios are updates of the 2016 scenarios that incorporate revised methodology and feedback from the Users Board. The three scenarios do not represent USACE's position on cost sharing, tax rate for IWTF, or any other policy changes. The three scenarios are included for comparison purposes to inform decision makers about project completion timelines and total costs based on different annual funding amounts.

4.6.1 Baseline Scenario

The Baseline Scenario (Table 15) is similar to the 2016 CIS Baseline Scenario. At the time this report was prepared, it assumed that the IWTF revenues will be $118 million and $2 million interest payments. The specific assumptions are as follows:

- The current cost sharing (50 percent federal/50 percent IWTF) continues.
- The annual fuel tax revenue and interest starts at $120 million in FY 2021 and grows 1.5 percent per year throughout the planning analysis. Therefore, the program starts at $240 million per year in FY 2021 and grows 1.5 percent annually. This assumption revises the 2016 CIS Baseline Scenario assumptions that General Treasury funding is limited to $180 million per year and the navigation program total is limited to $250 million per year.
- The minimum IWTF balance is $20 million.
- The principle of efficient construction is applied. A project will not start construction if there is not sufficient funding for it to be efficiently constructed (i.e., a project would not be broken into smaller units to match funding if doing so would result in inefficient construction and therefore potentially higher overall costs).
- Preconstruction engineering and design (PED) funding is rebalanced at the end of construction in order to simplify the analysis. This assumption is a change from the 2016 CIS Report. The PED is initially funded from the General Treasury in the Investigations appropriation, and then the 50 percent share is drawn from the IWTF after construction is started. PED that occurs during construction is included in the construction funding amounts and is not separately listed.
- The internal and external resources are available to execute the funding in this scenario.

4.6.2 Enhanced Scenario

The Enhanced Scenario (Table 16) represents a "what-if" scenario to demonstrate the increased number of projects that could be completed with additional funding. It assumes that the total available funding appropriated annually for design and construction is a maximum of $400 million. This scenario is an update of the 2016 Annual Allocation scenario. The specific assumptions include:

- The maximum funding available for both design and construction is $400 million per year and grows 1.5 percent per year throughout the planning analysis. Any funds not expended in a given year are available for expenditure in subsequent years.
- USACE is not assuming any changes in the cost sharing, fuel tax rate, or other necessary expenses.
- The principle of efficient construction is applied. A project will not start construction if there is not sufficient funding for it to be efficiently constructed (i.e., a project would not be broken into smaller units to match funding if doing so would result in inefficient construction and therefore potentially higher overall costs). The result is that construction is delayed until sufficient funds are available to proceed.
- PED funding is rebalanced at the end of construction in order to simplify the analysis. This assumption is a change from the 2016 CIS Report. The PED is initially funded from the General Treasury in the Investigations appropriation, and then the 50 percent share is drawn from the IWTF after construction is started. PED that occurs during construction is included in the construction funding amounts and is not separately listed.
- The internal and external resources are available to execute the funding in this scenario.

4.6.3 Maximized Construction Scenario

The Maximized Construction Scenario (Table 17) is an update of the 2016 Maximized Scenario and represents a "what-if" scenario to demonstrate the funding required to complete construction of all Category 1 and Category 2 projects in a 10-year period. It assumes that the sufficient funding is appropriated annually for design and construction to construct the Category 1 and Category 2 projects by 2033. The specific assumptions are as follows:

- The funding is available to complete design and construction of Category 1 and 2 projects by 2033.
- USACE is not assuming any changes in the cost sharing, fuel tax rate, or other necessary expenses.
- The principle of efficient construction is applied. A project will not start construction if there is not sufficient funding for it to be efficiently constructed (i.e., a project would not be broken into smaller units to match funding if doing so would result in inefficient construction and therefore potentially higher overall costs). The result is that construction is delayed until sufficient funds are available to proceed.
- PED funding is rebalanced at the end of construction in order to simplify the analysis. This assumption is a change from the 2016 CIS Report. The PED is initially funded from the General

Treasury in the Investigations appropriation, and then the 50 percent share is drawn from the IWTF after construction is started. PED that occurs during construction is included in the construction funding amounts and is not separately listed.

- The internal and external resources are available to execute the funding in this scenario.

4.7 Key Funding Scenario Comparison

The three funding scenarios provide decision makers with information about the timelines to complete the project based on different funding amounts.

- The Baseline Scenario represents a $5.7 billion program over the next 20 years in which 10 projects will be completed, and two projects will be ongoing. There would be still three projects remaining to start construction, which would be completed by 2051 at an estimated total cost of $9 billion.
- The Enhanced Scenario represents a $7.6 billion program from FY 2021 to FY 2039 with all 15 projects complete.
- The Maximized Construction Scenario represents a $6.9 billion program from FY 2021 to FY 2033 with all 15 projects complete.

Table 15. Baseline Scenario from FY 2021 – FY 2040 ($M)

Project	Project Description	Waterway	FY2021	FY2022	FY2023	FY2024	FY2025	FY2026	FY2027	FY2028	FY2029	FY2030	FY2031	FY2032	FY2033	FY2034	FY2035	FY2036	FY2037	FY2038	FY2039	FY2040	Project Design Total (FY21 - FY40)	Project Construction Total (FY21 - FY40)
Olmsted Locks & Dam	New locks and dam.	Ohio																					$ -	$ -
Locks & Dams 2, 3, & 4 Monongahela River Navigation Project	New Lock	Monongahela																					$ -	$ -
Kentucky Lock Addition	New Lock	Tennessee	60	89	63	11	8																$ -	$ 230
Chickamauga Lock	New Lock	Tennessee	110	163	139	132	19																$ -	$ 562
NESP Upper Miss. River L&D 25	New 1200ft lock	Mississippi	6	101	104	107	110	113	20														$ 6	$ 555
Three Rivers	channel protection	MKARNS		5	5	68	82	85	11														$ 11	$ 246
Upper Ohio - Montgomery L&D	New 600 ft lock	Ohio			17	8	1	62	103	168	205	145	26										$ 26	$ 709
NESP IWW LaGrange L&D	New 1200ft lock	Illinois						9	15	13	99	102	105	109	112	37							$ 37	$ 564
NESP Upper Miss. River L&D 24	New 1200ft lock	Mississippi							9	16	16	123	127	130	134	138	41						$ 41	$ 694
MKARNS 12' Channel	channel deepening	MKARNS									10	10	65	67	69	71	50	20					$ 20	$ 341
NESP Upper Miss. River L&D 22	New 1200ft lock	Mississippi											9	14	9	100	103	106	109	113	32		$ 32	$ 564
Upper Ohio - Emsworth L&D	New 600 ft lock	Ohio													19	20	22	117	190	266	201	60	$ 60	$ 834
NESP Upper Miss. River L&D 21	New 1200ft lock	Mississippi																12	21	21	166	171	$ 54	$ 337
NESP IWW Peoria L&D	New 1200ft lock	Illinois																	12	21	22	112	$ 56	$ 112
Upper Ohio - Dashields L&D	New 600 ft lock	Ohio																					$ -	$ -
NESP Upper Miss. River L&D 20	New 1200ft lock	Mississippi																					$ -	$ -
TJ O'Brien	Major Rehabilitation	Illinois																					$ -	$ -

20-YR DESIGN TOTAL:	**$343M**
20-YR CONSTRUCTION TOTAL:	**$5,748M**

Notes:

- The 2020 Capital Investment Strategy Report serves the purpose of Section 302(b) of the Water Resources Development Act of 1986 (WRDA 1986) as amended by Section 2002(d) of the Water Resources Reform and Development Act of 2014 (33 U.S.C. 2251). Funding shown for FY 2021 (October 1 – September 30) and beyond is only notional, representing approximate funding levels that would be needed to sustain the work displayed in the CIS for any particular fiscal year. The funding does not represent a commitment by the Administration to budget the amounts shown.
- The cost information for Kentucky Lock Addition and Chickamauga Lock were presented at Inland Waterways Users Board Meeting on October 30, 2020. The costs for all other projects is the best available information at the time this report was prepared.

Table 16. Enhanced Scenario from FY 2021 – FY 2040

Project	Project Description	Waterway	FY2021	FY2022	FY2023	FY2024	FY2025	FY2026	FY2027	FY2028	FY2029	FY2030	FY2031	FY2032	FY2033	FY2034	FY2035	FY2036	FY2037	FY2038	FY2039	FY2040	Project Design Total (FY21 - FY40)	Project Construction Total (FY21 - FY40)
Olmsted Locks & Dam	New locks and dam.	Ohio																					$ -	$ -
Locks & Dams 2, 3, & 4 Monongahela River Navigation Project	New Lock	Monongahela																					$ -	$ -
Kentucky Lock Addition	New Lock	Tennessee	60	89	63	11	8																$ -	$ 230
Chickamauga Lock	New Lock	Tennessee	110	163	139	132	19																$ -	$ 562
NESP Upper Miss. River L&D 25	New 1200ft lock	Mississippi	10	6	104	107	110	113	117	20													$ 17	$ 572
Three Rivers	channel protection	MKARNS	5	5	66	80	82	10															$ 10	$ 239
Upper Ohio - Montgomery L&D	New 600 ft lock	Ohio	7	1	57	94	153	187	133	24													$ 8	$ 648
NESP IWW LaGrange L&D	New 1200ft lock	Illinois				8	14	12	94	96	99	102	105	35									$ 35	$ 532
NESP Upper Miss. River L&D 24	New 1200ft lock	Mississippi					9	15	15	116	119	123	127	130	39								$ 39	$ 655
MKARNS 12' Channel	channel deepening	MKARNS						9	9	59	61	63	65	45	18								$ 18	$ 312
NESP Upper Miss. River L&D 22	New 1200ft lock	Mississippi					8	12	7	84	86	89	92	94	27								$ 27	$ 472
Upper Ohio - Emsworth L&D	New 600 ft lock	Ohio									17	17	19	104	168	237	179	53					$ 53	$ 741
NESP Upper Miss. River L&D 21	New 1200ft lock	Mississippi									10	17	17	135	139	143	148	152	44				$ 44	$ 761
NESP IWW Peoria L&D	New 1200ft lock	Illinois											10	18	18	94	97	100	103	106	47		$ 47	$ 545
Upper Ohio - Dashields L&D	New 600 ft lock	Ohio											18	18	20	104	169	237	179	56			$ 56	$ 744
NESP Upper Miss. River L&D 20	New 1200ft lock	Mississippi											10	18	18	95	98	101	104	107	47		$ 47	$ 551
TJ O'Brien	Major Rehabilitation	Illinois													6	74	6						$ 6	$ 80

20-YR DESIGN TOTAL:	**$406M**
20-YR CONSTRUCTION TOTAL:	**$7,644M**

Notes:

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- The cost information for Kentucky Lock Addition and Chickamauga Lock were presented at Inland Waterways Users Board Meeting on October 30, 2020. The costs for all other projects is the best available information at the time this report was prepared.

Table 17. Maximized Construction Scenario from FY 2021 – FY 2040 ($M)

Project	Project Description	Waterway	FY2021	FY2022	FY2023	FY2024	FY2025	FY2026	FY2027	FY2028	FY2029	FY2030	FY2031	FY2032	FY2033	FY2034	FY2035	FY2036	FY2037	FY2038	FY2039	FY2040	Project Design Total (FY21 - FY40)	Project Construction Total (FY21 - FY40)
Olmsted Locks & Dam	New locks and dam.	Ohio																					$ -	$ -
Locks & Dams 2, 3, & 4 Monongahela River Navigation Project	New Lock	Monongahela																					$ -	$ -
Kentucky Lock Addition	New Lock	Tennessee	60	89	63	11	8																$ -	$ 230
Chickamauga Lock	New Lock	Tennessee	110	163	139	132	19																$ -	$ 562
NESP Upper Miss. River L&D 25	New 1200ft lock	Mississippi	10	6	104	107	110	113	117	20													$ 17	$ 572
Three Rivers	channel protection	MKARNS	5	5	66	80	82	10															$ 10	$ 239
Upper Ohio - Montgomery L&D	New 600 ft lock	Ohio	7	1	57	94	153	187	133	24													$ 8	$ 648
NESP IWW LaGrange L&D	New 1200ft lock	Illinois	13	11	83	86	88	91	94	31													$ 23	$ 473
NESP Upper Miss. River L&D 24	New 1200ft lock	Mississippi		8	14	14	106	109	113	116	119	36											$ 36	$ 599
MKARNS 12' Channel	channel deepening	MKARNS			8	8	54	56	58	59	41	17											$ 17	$ 286
NESP Upper Miss. River L&D 22	New 1200ft lock	Mississippi		7	11	7	77	79	81	84	86	25											$ 25	$ 432
Upper Ohio - Emsworth L&D	New 600 ft lock	Ohio		14	14	16	85	137	192	145	43												$ 43	$ 603
NESP Upper Miss. River L&D 21	New 1200ft lock	Mississippi				8	14	15	117	120	124	127	131	38									$ 38	$ 657
NESP IWW Peoria L&D	New 1200ft lock	Illinois				8	14	15	76	79	81	83	86	38									$ 38	$ 443
Upper Ohio - Dashields L&D	New 600 ft lock	Ohio					15	15	17	87	141	198	150	47									$ 47	$ 623
NESP Upper Miss. River L&D 20	New 1200ft lock	Mississippi					9	15	15	80	82	84	87	90	39								$ 39	$ 461
TJ O'Brien	Major Rehabilitation	Illinois							5	62	5												$ 5	$ 67

20-YR DESIGN TOTAL:	**$346M**
20-YR CONSTRUCTION TOTAL:	**$6,894M**

Notes:

- The 2020 Capital Investment Strategy Report serves the purpose of Section 302(b) of the Water Resources Development Act of 1986 (WRDA 1986) as amended by Section 2002(d) of the Water Resources Reform and Development Act of 2014 (33 U.S.C. 2251). Funding shown for FY 2021 (October 1 – September 30) and beyond is only notional, representing approximate funding levels that would be needed to sustain the work displayed in the CIS for any particular fiscal year. The funding does not represent a commitment by the Administration to budget the amounts shown.
- The cost information for Kentucky Lock Addition and Chickamauga Lock were presented at Inland Waterways Users Board Meeting on October 30, 2020. The costs for all other projects is the best available information at the time this report was prepared.

5. Proposed Future Improvements

5.1 Annual CIS Update

The CIS Report should be reviewed annually and updated in coordination with feedback from Inland Waterways Users Board. The annual updates will form the foundation of the report provided to Congress, which is required by Section 302(d) of WRDA 1986 at least every five years. The annual update is important so that data and analysis remain current in order to provide reliable and accurate information to decision makers. In addition, the annual update will continue to improve through development of additional data and analysis approaches and experience with execution. The entire CIS Report may be updated if required, but at a minimum, it is recommended that annually the project-specific data and information (status, schedule, costs, benefits, and risks) be reviewed and updated as needed, along with project categorization updates.

5.2 Standardization

USACE is adopting the concept of standardization of components across the Nation's inland waterways system as a long-term objective. Not all systems and components will be standardized, as that is not a realistic goal. A framework for standardization has been developed around opportunities for lifecycle cost reduction, increased reliability, common maintenance practices, reduced spare part inventory, and other factors. Future asset management phases will promote opportunity for standardization by providing system risk classifications (need and timing) across many projects such that design for broader implementation is considered as an engineering objective. Focus areas include machinery, upper lock gates, hydraulic systems, and other lock components.

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Appendix A: Acronyms

BCR: Benefit to Cost Ratio

BLM: Business Line Manager

CIS: Capital Investment Strategy

CPBM: Capital Projects Business Model

CY: Calendar Year

FTW: Fuel Taxed Waterways

FY: Fiscal Year

GIWW: Gulf Intracoastal Waterway

HQUSACE: U.S. Army Corps of Engineers Headquarters

IMTS: Inland Marine Transportation System

INAV: Inland Navigation

INDC: Inland Navigation Design Center

IPAT: Investment Program Action Team

IWR: Institute for Water Resources

IWTF: Inland Waterways Trust Fund

IWW: Illinois Waterway System

L&D: Lock and Dam

LRD: Great Lakes and Ohio River Division

LRP: Pittsburgh District

MKARNS: McClellan-Kerr Arkansas River Navigation System

MRR: Major Rehabilitation Report

MSC: Major Subordinate Command

MVD: Mississippi Valley Division

MVR: Rock Island District

MVS: St. Louis District

NAD: North Atlantic Division

NDC: Navigation Data and Decision Support Center

NED: National Economic Development

NESP: Upper Mississippi River-Illinois Waterway System Navigation and Ecosystem Sustainability Program

NWD: Northwestern Division

NWW: Walla Walla District

OCA: Operational Condition Assessment

O&M: Operation and Maintenance

ORA: Operational Risk Assessment

ORE: Operational Risk Exposure

PCXIN: Planning Center of Expertise for Inland Navigation

PDT: Project Delivery Team

PED: Preconstruction Engineering and Design

RBRCR: Remaining Benefit to Remaining Cost Ratio

RM: River Mile

SAD: South Atlantic Division

SAM: Mobile District

SCC: Shipper Carrier Cost

SWD: Southwestern Division

UMR: Upper Mississippi River

USACE: U.S. Army Corps of Engineers

Users Board: Inland Waterways Users Board

WRDA 1986: Water Resources Development Act of 1986

WRRDA 2014: Water Resources Reform and Development Act of 2014

Appendix B: Contributors

This report was prepared in response to Section 2002 of the Water Resources Reform and Development Act of 2014 and represents a cooperative effort between the U.S. Army Corps of Engineers and inland navigation stakeholders. This is a planning framework and does not take the place of the normal budget processes or commit the Government to future actions. The information and findings in this report represent those of U.S. Army Corps of Engineers and do not necessarily reflect those of the Inland Waterways Users Board.

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Appendix C: Inland and Intracoastal Fuel Taxed Waterways

Statutory Definitions of Inland and Intracoastal Fuel Taxed Waterways of the United States

SOURCES: Public Law 95-502, October 21, 1978
Public Law 99-662, November 17, 1986

1. Alabama-Coosa Rivers: From junction with the Tombigbee River at RM 0 to junction with Coosa River at RM 314.

2. Allegheny River: From confluence with the Monongahela River to form the Ohio River at RM 0 to the head of the existing project at East Brady, PA, RM 72.

3. Apalachicola-Chattahoochee and Flint Rivers: Apalachicola River from mouth at Apalachicola Bay (intersection with the GIWW) RM 0 to junction with Chattahoochee and Flint Rivers at RM 107.8. Chattahoochee River from junction with Apalachicola and Flint Rivers at RM 0 to Columbus, GA, at RM 155. Flint River, from junction with Apalachicola and Chattahoochee Rivers at RM 0 to Bainbridge, GA, at RM 28.

4. Arkansas River (McClellan-Kerr Arkansas River Navigation System): From junction with Mississippi River at RM 0 to Port of Catoosa, OK, at RM 448.2.

5. Atchafalaya River: From RM 0 at its intersection with the GIWW at Morgan City, LA, upstream to junction with Red River at RM 116.8.

6. Atlantic Intracoastal Waterway: Two inland waterway routes approximately paralleling the Atlantic coast between Norfolk, VA, and Miami, FL, for 1,192 miles via both the Albemarle and Chesapeake Canal and Great Dismal Swamp Canal routes.

7. Black Warrior-Tombigbee-Mobile Rivers: Black Warrior River System from RM 2.9, Mobile River (at Chickasaw Creek) to confluence with Tombigbee River at RM 45. Tombigbee River (to Demopolis at RM 215.4) to port of Birmingham, AL, RMs 374-411 and upstream to head of navigation on Mulberry Fork (RM 429.6), Locust Fork (RM 407.8), and Sipsey Fork (RM 430.4).

8. Columbia River (Columbia-Snake Rivers Inland Waterway): From the Dalles at RM 191.5 to Pasco, WA (McNary Pool), at RM 330, Snake River from RM 0 at the mouth to RM 231.5 at Johnson Bar Landing, ID.

9. Cumberland River: Junction with Ohio River at RM 0 to head of navigation, upstream to Carthage, TN, at RM 313.5.

10. Green and Barren Rivers: Green River from junction with the Ohio River at RM 0 to head of navigation at RM 149.1.

11. Gulf Intracoastal Waterway: From St. Mark's River, FL, to Brownsville, TX, 1,134.5 miles.

12. Illinois Waterway (Calumet-Sag Channel): From the junction of the Illinois River with the Mississippi River RM 0 to Chicago Harbor at Lake Michigan, approximately RM 350.

13. Kanawha River: From junction with Ohio River at RM 0 to RM 90.6 at Deepwater, WV.

14. Kaskaskia River: From junction with Mississippi River at RM 0 to RM 36.2 at Fayetteville, IL.

15. Kentucky River: From junction with Ohio River at RM 0 to confluence of Middle and North Forks at RM 258.6.

16. Lower Mississippi River: From Baton Rouge, LA, RM 233.9 to Cairo, IL, RM 953.8.

17. Upper Mississippi River: From Cairo, IL, RM 953.8 to Minneapolis, MN, RM 1,811.4.

18. Missouri River: From junction with Mississippi River at RM 0 to Sioux City, IA, at RM 734.8.

19. Monongahela River: From junction with Allegheny River to form the Ohio River at RM 0 to junction of the Tygart and West Fork Rivers, Fairmont, WV, at RM 128.7.

20. Ohio River: From junction with the Mississippi River at RM 0 to junction of the Allegheny and Monongahela Rivers at Pittsburgh, PA, at RM 981.

21. Ouachita-Black Rivers: From the mouth of the Black River at its junction with the Red River at RM 0 to RM 351 at Camden, AR.

22. Pearl River: From junction of West Pearl River with the Rigolets Strait at RM 0 to Bogalusa, LA, RM 58.

23. Red River: From RM 0 to the mouth of Cypress Bayou at RM 236.

24. Tennessee River: From junction with Ohio River at RM 0 to confluence with Holstein and French Rivers at RM 652.

25. White River: From RM 9.8 to RM 255 at Newport, AR.

26. Willamette River: From RM 21 upstream of Portland, OR, to Harrisburg, OR, at RM 194.

27. Tennessee-Tombigbee Waterway: From its confluence with the Tennessee River to the Warrior River at Demopolis, AL.