SAUGUS RIVER COASTAL STORM RISK MANAGEMENT FEASIBILITY STUDY

REVERE, LYNN, SAUGUS, MALDEN, EVERETT & NAHANT, MA

GUIDANCE TO EXPEDITE STUDY & FEATURES FOR SEA LEVEL RISE

Without Back-up Document Attached

EXECUTIVE SUMMARY

1 September 2026

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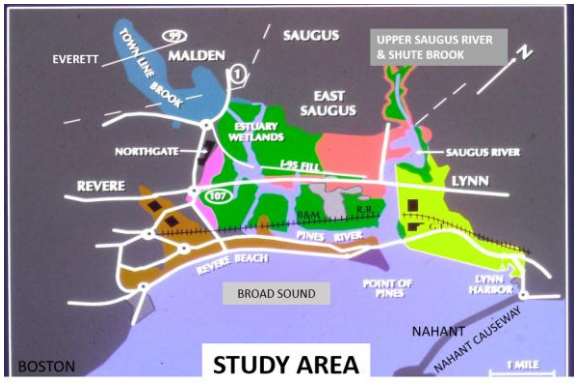
TO BE REVIEWED BY SPONSORS & CORPS OF ENGINEERS

The web site **saugusriverfloodgates.com** includes the Back-up for this document, the 1990 Feasibility Report, EIS/EIR, and Design Reports, Certificate and appropriate letters, photos and project slides.



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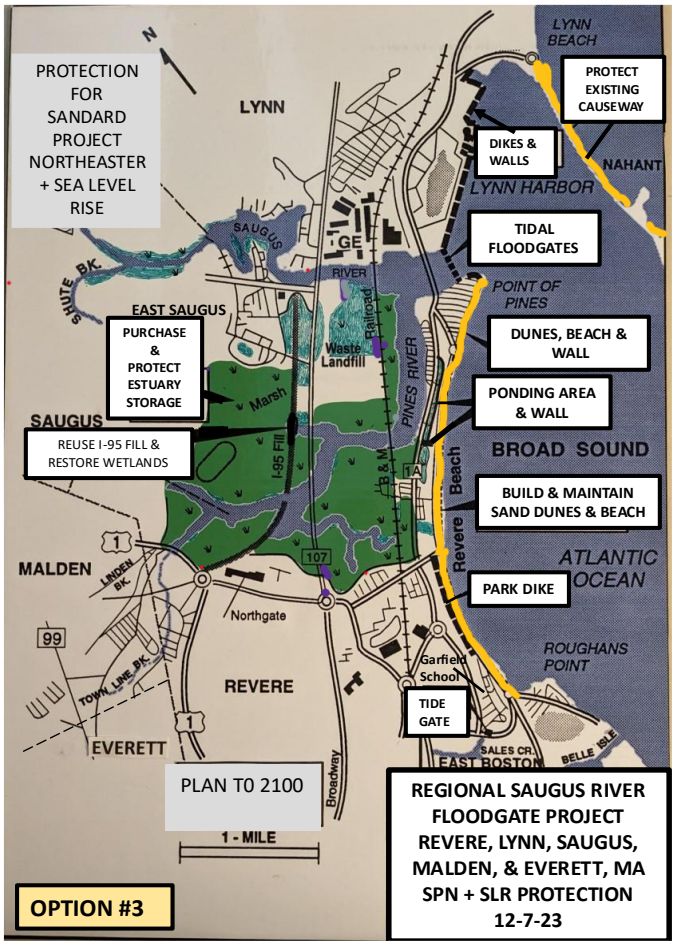
EXECUTIVE SUMMARY

Purpose: This report explains that the original investigations by the Saugus River and Tributaries Flood Damage Reduction Study, its 1990 Feasibility Report, EIS/EIR, and 1993 Design reports provide sufficient information to expedite the new and updated subject Feasibility Study without excessive investigations or detailed studies, and to describe new and modified features for sea level rise. The new study was required and authorized to be expedited by President Biden prior to proceeding into final design for a regional project. The Government had invested $8.6 million, $20 million at today's prices, on the original study and a Regional Project, and the Government may now accept funding from the Commonwealth or local funds, to expedite the study, which should be completed in a year for $500k+ to help avoid further hardship by the region. The nonfederal sponsors may be interested in pursuing this approach through their Legislative Delegation.



The danger facing the region can best be explained by the impacts of past storms and future damages. As in the Blizzard of 1978 residents experienced a catastrophic blizzard over several freezing days without power, heat or emergency services as homes and roads were flooded up to 7-feet deep and homes burned-- and the threat now heightens. The Blizzard of 1978 flooded 3,100 buildings with about 5,000 housing units in this region, and now flooding is experienced monthly. The recurring damages from a 1978 storm at 2026 dollars would be $390 million, but much higher today since sea level has risen half a foot. The worst storm likely to hit, the Standard Project Northeaster with a very low probability, would flood between 5,100 to 7,000 buildings as seas rise causing $1 billion in damages today, doubling by 2050, reaching $4B by 2100 from a single storm impacting a million folks-- residents, employees and commuters. By 2100, the total damages prevented or the average annual benefit of $53 million from a regional project over the next 74 years would prevent over $4 billion in losses. This is with only about half of buildings damage surveyed so far.

The 1990 Feasibility Report recommended after 4 years of study that the Regional Saugus River Floodgate Project with a First Cost today of $335 million, would provide the highest level of protection to the entire region with least social impact, and offered protection and environmental benefits by improving flushing and purchasing a prestigious Estuary. It received overwhelming support from the region, sponsored by the Commonwealth and authorized by Congress. It remains the only viable

solution to protect the region from accelerated sea level rise. After 8 years of planning and final design, the project was in its 4th year of final design when placed on hold.

Comparison of Plans: The following Updated Plan Comparison Table shows the three major options evaluated in the 1990 Feasibility Report. The plans have been updated for costs and benefits based on the Engineering News Record Construction and Building Cost indices. Also, adjustments to plans and costs and benefits were adjusted based on a sea level rise of 4.2 feet by 2090 which were evaluated in the 1990 Report. Adjustments include new features and raising shorefront structures to keep pace with sea level rise, currently rising half a foot in about 10-years, formerly taking 50 years!

The Comparison table has some significant changes since the 1990 Report, including costs and benefits, sea level impacts on flooding, project features, social, and environmental issues. However, these changes do not necessarily demand more detailed investigations or lengthy study to prepare a Feasibility Report before justifying and moving quickly into design. The challenge for both the Corps and sponsors is to "EXPEDITE" the study and limit the scope of work to achieve the results **in a year** to avoid prolonging the threat of rising seas and more intense coastal storms through the mid-30s through 40s, endangering the region. The Comparison Table continues to show the same results as in 1990, that the Regional Project, Option#3, has outstanding advantages over the other options.

Option#1 Local Protection Plans would provide protection against the worst coastal storms likely to occur, the Standard Project Northeaster (SPN) to protect 5 areas with 4,320 buildings including: the Revere Beach Backshore, Point of Pines, Lynn, East Saugus and Town Line Brook area. It requires 9.8-miles of walls, dikes and sand dune/beach features at a 2026 First Cost of about $295 million. After the East Saugus LPP was built, sand needed from the I-95 for Point of Pines could be used to breach the embankment and improve flushing to the upper estuary. However, the plan would continue to have adverse impacts on views and lost wetlands from walls and dikes surrounding communities by reaching heights of about 12 to 17-feet above the shoreline. It would leave unprotected: the Northgate and Upper Saugus River areas, Routes 1, 1A, 107 and B&M railroad, and the Ash Landfill. Of particular concern are the 80 tide gates for drainage systems and gated access openings. Due to the difficulty of maintaining them and history of poor maintenance, failure to close with tide water heights rising to ten (10) feet above them, could be devastating from severe leakage or extensive flows. If the entire 25-miles of shorelines were raised or transportation arteries raised, the cost would escalate to well over twice as high. Support will likely continue to be lacking for this option for obvious reasons and not warrant further detailed study, but a cursory update as accomplished here.

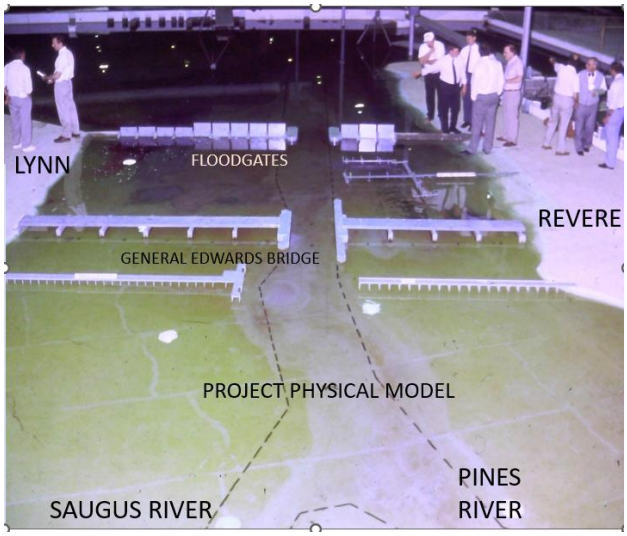
Option#2 Nonstructural Plans evaluated protecting homes or businesses in the 100-year floodplain which justified only a very limited number to be protected. Roughly about 350 buildings,7 percent, might justify raising or floodproofing at a 1996 First Cost of $37 million. But now a more serious problem faces this option. As sea levels rise, all properties, streets, and highways will continuously be inundated as sea levels rise to 5 Feet by 2100. Most streets, highways and properties are located between elevation 8 to 10 feet NGVD. Extensive flooding will be experienced monthly as non-storm tides rise to MHW at El. 10 and MSHW to El. 11, while coastal storms and the SPN flood levels approach El. 20. Also, the idea of raising hundreds or thousands of homes upwards of 12 feet is not likely. Total evacuation of buildings from the floodplain is in the vicinity of at least $10 billion. As pointed out in the Secretary's Environmental Certificate, flood warning will be very difficult in this region. Support for this option also is expected to remain very minimal, if any, lacking justification for more study. However, discussions are needed with resource agencies to resolve any issues.

SAUGUS RIVER COASTAL STORM RISK MANAGEMENT FEASIBILILITY STUDY
Revere, Lynn, Saugus, Malden, Everett & Nahant, MA
UPDATED PLAN COMPARISON

	Option#1 5- Local Protection Plans	Option#2 Nonstructural	Option#3 Regional Plan
Buildings Protected: Today vs. 2100	4,320+	**350+**	**5,100 vs.7,000+**
Damages Prevented over 74 Years	--	--	**$4 Billion plus buildings to be surveyed.**
Buildings remaining to be Surveyed for Damages	--	--	1,400 - 3,400
Damages prevented, single SPN* storm: Today vs. 2100	--	--	$1B vs. $4B
Coastal Protection thru 2100 @ 5Ft. Sea Level Rise (SLR):			
Residential & Businesses, Level of Protection	SPN*+5Ft.SLR	100 yr.	SPN+5Ft. SLR
Northgate & Upper Saugus River Areas & Ash Landfill	**NO**	NO	YES
Routes 1, 1A, & 107, & B&M RR (El. 7–10 ft. NGVD)	**NO**	NO	YES
Flooding thru 2100 from MHW El. 10; MSHW El.11	Part of Area	**Extensive, daily**	NO
Length of New Structures initially	9.8 Miles	--	3.5 Miles
Structures & Revere Beach Dune/Beach after 2050+	12.3 Miles		6 Miles
Height of Structures by 2100	**12-17 Feet***	**12 Ft**	8-11 Feet *
Height of 25 miles Shoreline Walls to Reduce Floodgate Closures*			2-3 Ft. by 2040
Total Height of Shoreline Walls to Maintain 3-40 Closures /Year*			5-6 Ft. by 2100
*Walls include 2 Feet of Freeboard (1-foot may suffice)			
Environmental Considerations:			
Estuary Protected, Purchased in Fee & Managed	NO	NO	**YES**
Improve Estuary Flushing to 500 Acres	YES	NO	**YES**
Restore area under I-95 to wetlands after fill's removed	YES	NO	YES
Wetlands Lost initially vs. by 2100, Mitigated	33.7 v.50+ Acres	0	3 Acres v. TBD
Loss of Views/Aesthetic Impact	**Very High**	YES	15-20 Homes
Plan Economics (2026 price level):			
First Cost (Millions)	$295	$37	$335
PW of Shoreline Walls & Dune/Beach 2060-2090	$29	--	$19
Total Investment (Millions)	$324	--	$354
Average Annual Benefits (Millions)	$43	$7	$53
Average Annual Cost (Millions)	$32	$4	$35
Average Annual Net Benefits (Millions)	$11	$3	**$18**
Benefit to Cost Ratio	1.3 to 1	1.8 to 1	1.5 to 1
Evaluation Criteria: Complete	YES	YES	YES
Effective, 80 gates (high vs. low water) Concern:	**Severe**	NO	Minimal
Efficient	YES	YES	YES
Assumed still Acceptable to Sponsor	Minimal	Minimal	High

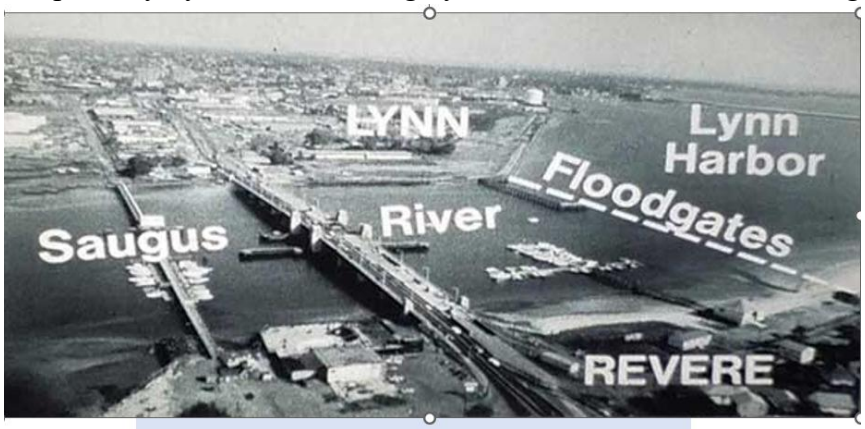
*SPN: Standard Project Northeaster: Worst coastal storm likely to occur.

<u>Option#3 the Regional Saugus River Floodgate Plan</u> would provide SPN protection with rising sea levels through and beyond 2100 to protect the entire region in hopes that future actions would stall or reverse the effects of climate change. The Regional Plan would protect over 5,100 to 7,000 buildings, all transportation arteries and the Ash Landfill with 3.5 miles of structures and dunes at a 2026 First Cost of about $335 million. It includes a 1,330-foot-long Floodgate structure across the mouth of the Saugus River with 500 feet of gated openings using a 100-foot-wide navigation gate and eight (8) 50- foot-wide flushing gates to maintain the natural tide levels and flushing in the estuary and safe passage for navigation. It would be tied into walls, dikes and sand dunes/beach along the shores of Lynn Harbor, Point of Pines and Revere Beach's existing seawalls and a Park Dike to prevent overtopping against the SPN.



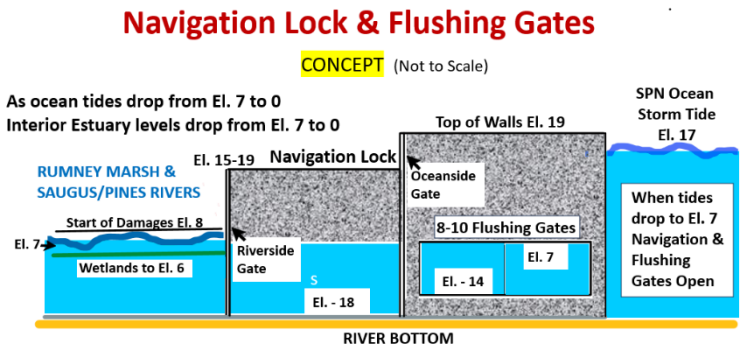
Detailed investigations by the Corps' Coastal Engineering Research Center determined that the coarse-grained sand from the I-95 embankment was very resistant to erosion and recommended it along Revere's cost. The study should consider this at Point of Pines now and for Revere Beach in the future to provide protection against sea level rise and the SPN. Using the I-95 fill to breach the East Branch of the Pines River though the embankment, after the Floodgates are operational, would help restore flushing to the upper 500-acres of the estuary. After a foot or two of sea level rise by 2060, Revere Beach will likely need a complete Dune/Beach system along its entire length. It is assumed the Nahant Causeway may need a dune/beach system to eventually protect it as well.

The plan includes management and purchase in fee of the 1,650-acre estuary to protect its resources and provide flood water storage of runoff when gates are closed. The floodgates would close more often as sea levels rise reaching 50 closures per month for 6-hours each by 2090. To prevent this, low level walls or dikes along the rivers' shorelines would raise the start of damages, and reduce the number of closures, possibly to 3-40 per year as sea level rises each foot. Initially walls would be about 2-3-feet tall possibly by 2040, increasing by 2100 to 5-6-feet tall. Reducing the number and frequency of closures would eliminate significant impacts on fisheries, wetlands and water quality in the Estuary. Closures would cause some impact on recreation and lobster boats, especially if construction is delayed for raising the walls. A navigation lock structure, designed for these boats, should be considered so boats can pass at any tide level. The initial 100-foot-wide navigation gate, a massive 164-foot-wide structure, was designed for passage of General Electric's oil barge, long since discontinued. Designing a gate or even a navigation lock, shown below, to meet requirements of recreation and lobster boats might reduce the opening to about 25 feet wide. A 25-foot-



LOCATION FOR TIDAL FLOODGATES

wide lock and two (2) more 50-foot-wide flushing gates would nearly offset the width and cost of the 164-foot-wide navigation gate structure.



On or Before the Year 2100:
Sea Levels Rise 5 feet, Mean Tide Range El. 10 to El. 0, Ft. NGVD
The Standard Project Northeaster (SPN) Reaches El. 17 feet, NGVD
(Without floodgates, flood levels would surge with sustained northeast winds into rivers and properties up to 3-4-feet higher than Ocean levels to El. 20 Ft. NGVD)

Once low-level walls are required along the rivers' shoreline to raise the start of damage, the 80 drainage tide gates or gated access openings would be subject to only a 1–3-foot head of water with little danger of significant flooding if failure occurred. The plan provides the opportunity to create sand dune/beach protection along Revere's coast by removing and using all or part of the abandoned I-95 embankment, thus restoring the natural flushing to the upper estuary and developing additional wetlands to the area where sand is removed.

The Regional Plan provides the highest level of protection to the entire region with minimal social impact, offering substantial protection to the estuary, the highest net economic benefits of any plan, and has always been strongly supported and thus warrants additional studies.

Studies Recommended: There are several studies or issues which need to be tackled for this alternative to successfully complete an updated Feasibility Report, among them are:

1. Determine when shorefronts should be raised at what frequency for floodgate closures, and how high, are warranted;
2. Develop typical wall and dike sections for locating structures along the shoreline (to reduce closures) using the existing topographic maps used by the prior study and estimate costs;
3. Update the cost and impact of the project using available designs, drawing and estimates;
4. Prepare and coordinate a supplemental combined EIS/EIR;
5. Update the Project benefits using existing stage damage curves, and by modifying the existing Stage vs. Frequency curves adjusted for sea level rise;
6. Develop damages and benefits for remaining buildings and stage vs. damage curves for only what can be accomplished in a year without delaying the Feasibility Report;
7. Determine the minimum safe size of a navigation gate and navigation lock, determine costs and benefits to reduce impacts on navigation from planned or unforeseen floodgate closures;
8. If there is available topographic mapping to determine a more precise number of buildings and areas in the SPN plus 5 to 8-foot sea level rise floodplain, proceed.
9. Consider and implement the recommendations of the Corps of Engineers' Coastal Engineering Research Center to use Dune/Beach systems to protect against the SPN and sea level rise for Point of Pines, replacing revetments, then for Revere Beach and when, and if necessary for Nahant Causeway. Delay detailed models until the design stage;
10. Identify the location for coarse-grained sand from the I-95 embankment and associated environmental benefits, likely breaching for the East Branch of the Pines River;
11. Review and update features along Lynn Harbor, recent inspection shows little change;
12. Use your study findings, information from the web site, and power point figures to modify the 1990 Feasibility Report, if possible, to expedite the study; and
13. Contact Matt Hunt at Matt@a2zcomputing.com for modifying web site to inform the public.

Studies Not Recommended to expedite completion of the Feasibility Report include:

1. Although there were only 3,700 buildings damaged surveyed in the floodplain for benefits, there remains between 1,400-3,400 buildings, not surveyed, to be protected by the project. The attached Comparison table and 1990 Feasibility Report show there are sufficient benefits to justify the higher levels of protection. The advantage of spending more than an additional year conducting topography, damage surveys, and hydrologic analyses simply to prove better economics is questionable considering the danger faced by residents. The 1990 Feasibility Report was approved without completing all damage surveys.
2. There does not appear to be any utility in restudying both Options #1 and 2 considering the previous discussions; and
3. There are sufficient environmental studies that determined resources in the Estuary, non-additional should be needed.

Public involvement and agency coordination should proceed while these studies are on-going. Some desired investigations could be accomplished during Pre-construction Engineering and Design, such as dune/beach models. Again, the CHALLENGE for the Corps and sponsors is to determine what is absolutely necessary to complete a Feasibility Report and avoid risking the lives, properties and businesses of these communities considering the danger facing them! So much work has already been accomplished.

ENVIRONMENTA CONCERNS--Agencies question the potential environmental impacts of the Regional Floodgate Project on the Rumney Marsh, an Area of Critical Environmental Concern (ACEC), which is located landward of the Floodgates. The Technical Group of agency and private interests, which helped the four public Steering Committees and the Corps of Engineers during the planning process, identified many concerns that were either eliminated, mitigated or dismissed. Following are the major concerns overcome resulting in a positive Environmental Certificate from the Secretary of Environmental Affairs. Incidentally, this same Group with the Corps help documented the value and loss of the Estuary resulting in its ACEC designation which exempted this Regional Project.

Major environmental issues resolved and issues addressed in the Environmental Certificate were:

1. To prevent development pressure on the Estuary after being protected from coastal flooding, the project was authorized to manage and purchase the Estuary in fee.;
2. To avoid impacts on the wetlands, fisheries and water quality, as well as navigation, the Floodgates underwent extensive surveys, and both physical and numerical modeling by the Corps Waterways Experiment Station in Vicksburg, MS to design it so there would be no impact on tide levels or flushing in the Estuary;
3. The location of the dikes along Lynn Harbor originally impacted the mudflats, so were then moved inland to eliminate the loss;
4. A concern for the peak of flooding events, that the marsh complex would shift in composition and boundary. Response: All marshes exist below elevation 7 and the operation of Floodgates calls for closure when the tide event has reached elevation 7, when all marsh would be inundated. Internal circulation from wind tends to decrease salinity gradients as at present.

5. A concern that storm event sediment transport will be crucial to the survival of the salt marsh with sea level rise. Response: The developed barrier beach and reduced storm action from the northeast by Nahant Causeway currently limit sediment from reaching the marsh. The significant addition of Sand Dunes and beach along the Revere shoreline would contribute to sediment transport.
6. Many felt that evacuation and flood proofing are viable options and must be used to avoid any of the identified impacts to the environment. Response: Flooding events in this particular estuary are difficult to predict in time to allow orderly evacuation. Combinations of events during the storm are crucial to decision making and many false emergencies would be declared under the existing conditions. Also with accelerated sea level rise, roads and properties will be frequently inundated.
7. Agencies and Saugus both support breaching the abandoned I-95 embankment once the Regional Project is built, to restore flushing to 500 acres of the upper estuary. Several Federal agencies specifically requested the Corp investigate breaching the embankment to restore the wetlands and enhance the upper estuary, which is a project objective. This is also a goal of the ACEC designation.
8. Saugus and interest groups voiced concern that coastal storms would erode the embankment of the Wheelabrator landfill located in the center of the estuary and contribute to the spreading of its pollutants into the surrounding communities and wetlands. Response: The Regional project would remove the threat of coastal floods surging into the estuary and significantly reduce wave action and tidal flooding of the landfill and reduce potential erosion. The Conservation Law Foundation is reported to be very concerned about the pollutants leaching out of the landfill.
9. WHY PROJECT DISCONTINUED The Regional Project was put on hold in September 1993 (after several Environmental Secretaries had supported it) since a new MA Environmental Secretary, from Rhode Island, stated she was opposed to construction along the coast and would not support this project. A letter from the MDC stated that further review of nonstructural solutions was warranted, which were never done.

The Sponsors and Corps of Engineers are now responsible to expedite this Feasibility Study!

STUDY AUTHORIZATION H.R. 7776 , the National Defense Authorization Act 2023 signed by President Biden on 23 Dec 2022 includes the Water Resources Development Act of 2022 (WRDA 2022), Sec. 8202, "Expedited Completion", states: "The Secretary shall expedite the completion of a feasibility study for each of the following projects, and if the Secretary determines that the project is justified in a completed report, may proceed directly to preconstruction planning engineering, and design of the project: Project for flood and coastal storm risk management and ecosystem restoration, Boston North Shore, Revere, Saugus, Lynn, Malden, and Everett, Massachusetts…"