U.S. Army Corps of Engineers, Savannah District
SCRIPT
Savannah Harbor Expansion Project (SHEP) Fish Passage Presentation
Augusta, Georgia
June 26, 2018

SLIDE 1

The purpose of today's presentation is provide you an update on the detailed work and analysis that has been completed to date to fulfill the Corps responsibilities as outlined in the Water Infrastructure Improvements for the Nation Act, commonly referred to as WIIN, that was signed into law in December 2016. The objective in our analysis process is to identify the most cost effective fish passage alternative that fulfills the mitigation requirements of the Savannah Harbor Expansion Project, the intent of Congress and addresses stakeholder and environmental concerns.

SLIDE 2

The Savannah Harbor Expansion Project or SHEP, located in Savannah Harbor, is currently under construction. The SHEP contains 8 environmental mitigation features of which the fish passage at the New Savannah Bluff Lock and Dam is one. The requirement to construct the fish passage is to comply with the Endangered Species Act and mitigate for impacts to shortnose and Atlantic sturgeon as a result of impacts to habitat and increased salinity experienced in the Savannah Harbor from the deepening project and as coordinated with state and federal resource agencies. Mitigation for the species was not available within the footprint of the Savannah Harbor area and the site in Augusta was approved based on the inability of the species to access historic spawning grounds located at the Augusta Shoals being blocked by the lock and dam.

SLIDE 3

As you all are familiar, the SHEP fish passage project area is primarily within the footprint of the New Savannah Bluff Lock and Dam. The Federal Government completed construction in 1937 for the purpose of supporting commercial navigation, primarily barge traffic, transporting goods thru the lock to up and downstream locations. Commercial navigation effectively ceased along the River in the 1979 timeframe and the structure moved into a caretaker status by the Corps of Engineers in the 1980s. Due to loss of commercial navigation, Federal funding was also curtailed. Although the lock and dam no longer serves commercial navigation, it continues to serve water supply users that include the cities of Augusta, GA, and North Augusta, SC, and several private industries. The pool created behind the dam also provides water-related recreation opportunities that support the general public as well as specialized events and tourism. As you will see later in this briefing, the Corps has expanded the project study area to include downstream and upstream areas from the lock and dam in our analysis being accomplished under the WIIN Act.

SLIDE 4

Over time, the structure has continued to deteriorate at a significant rate as this photo depicts. Cracks several feet deep have grown in the spillway piers. The filling in the lock wall is badly worn resulting in significant instability and unsafe conditions. Due to these safety concerns, all lock operations, previously

used to support recreational traffic, ceased in 2014. Structural erosion continues to cause loss of lateral support along lock wall piers as identified in a Corps 2016 inspection.

SLIDE 5

Prior to the passing of the WIIN Act in 2016, the original fish passage construction plan under the SHEP (depicted here) effectively excavated and created a new river channel for the purpose of fish passage on the South Carolina side of the River around the lock and dam. This design included modifications to be made on dam gates 1 and 5 in order to achieve 100% of the river flows necessary for the fish passage to function properly. With the passing of the WIIN in 2016, this plan is no longer an authorized option.

SLIDE 6

The key tenets contained in the WIIN Act are summarized here. The law instructs the Corps to determine the best solution to construct an in-channel fish passage rather than an "around the structure" previously approved for the SHEP. The legislation does de-authorize the lock and dam which was a separate Federal Project and identifies the SHEP as the responsible project moving forward following approval of a recommended solution outlined in the WIIN. The legislation preserves the upstream pool for the purposes and function of water supply, navigation, and recreation, and provides the Corps with two options from which to develop suitable alternatives: 1) either repair the lock wall and modify the current structure as needed, or, 2) to remove the lock and dam after construction of an in-river fish passage structure that would continue to provide a pool for water supply and recreation. The next series of slides will describe the detailed work the Corps team has accomplished since enactment of the WIIN as well as a review of the Corps process and criteria in which each alternative will be evaluated and compared.

SLIDE 7

Immediately after passage of the WIIN Act in 2016, the Corps and the Savannah District began detailed preparations that would set the conditions from which to conduct a successful analysis and provide a cost effective recommendation for the construction of an in-river fish passage. The Savannah District issued a public scoping notice that ran from April to June 2017 that requested comments and input from the communities and area stakeholders. This process ensured that the Corps captured the major concerns of the public and as a result, over 680 comments were received with the two primary concerns expressed to continue to provide a sufficient pool for water supply and recreation as well as to consider and address flood impacts in our alternatives development. In addition, the District team conducted analysis of industrial water intake infrastructure upstream of the lock and dam, depth surveys of public and private docks, as well as multiple engineering surveys in the river (such as bathymetric, side-scan sonar, Multi-beam, and obstruction identification surveys) and included depth analysis of public. The professional engineering team has conducted extensive hydraulic modelling that will be discussed later in this briefing that resulted in the alternatives you will see in later slides that are still under evaluation.

SLIDE 8

This slide may seem a bit busy and the goal is to break it down and discuss the deliberate Corps process that is being followed that will lead the Corps to provide a recommended plan to identify a cost effective fish passage alternative and the current timeline that we are working under.

Moving from left to right, as previously discussed, the Savannah District conducted public scoping from April-June of last year. We then went into the information gathering phase that included the scheduling of required surveys in the river to give us the most up to date conditions from which to begin to build our list of potential alternatives as well as making detailed assessments of upstream facilities and permitted water intake infrastructure. To this end, our professional engineers modelled over 33

different alternative scenarios throughout the project area that included extensive flood analysis that resulted in the team narrowing those 33 potential alternatives down to the final array of alternatives you will see today. The primary factor in eliminating previous alternatives was a result of flood impacts that would affect residential and commercial structures upstream. In concert with our resource agency partners, we have included endangered species experts on our team that have collaborated and provide input to each of our alternative concept designs. Experts from NOAA fisheries on our team include a Sturgeon Recovery Coordinator, a Fisheries Biologist, and a Professional Fish Passage Design Engineer.

Where we are currently in our schedule is in the process of concluding final upstream permitted water intake calculations and assessing any impacts from obstructions in the river such as the training walls that are located upstream between the cities of Augusta, GA, and North Augusta, SC, that were constructed over 100 years ago to assist commercial navigation along the Augusta side of the river. We will then be in a position to compare each of the final alternatives against evaluation criteria I will discuss next. We anticipate to complete our comparisons analysis by the fall of this year and select a draft recommend plan. At the draft recommended plan stage, we are required to conduct independent agency reviews as well as obtain approval of our higher headquarters, South Atlantic Division, to release the draft report and findings for public review and comments – currently projected for the winter 2019 timeframe. In addition to the public comment period, the report will concurrently undergo an Independent External Peer Review conducted by a firm comprised of academic and fish passage experts from outside the Corps before the report is forwarded for final approval.

SLIDE 9
Each of the final alternatives being studied are compared based on evaluation criteria that is directly derived from the WIIN legislation and shown here.

Fish Passage - First and foremost the recommended plan must fulfill the mitigation requirement of the SHEP to successfully be able to pass fish. All alternatives must facilitate the passing of shortnose sturgeon, Atlantic sturgeon, and other migratory fish in accordance with SHEP's mitigation requirement

Cost – The analysis must consider the most cost-effective solution and compare it to what would have been the cost of the original fish passage plan approved in 2014 under the SHEP. And it is important to note that the most cost-effective solution is not necessarily the least costly. Each alternative is compared to the original SHEP cost around the structure and the cost analysis includes construction cost, total project costs and the average annualized cost per year for that alternative. (real estate, construction, operation and maintenance). The federal share of the cost of the selected alternative shall not be greater than the cost of construction of the original SHEP approved plan to repair the lock and dam and construct a fish passage around the structure. The current estimated cost for the SHEP WRDA 2014 fish passage is approximately $63 million (which includes necessary repairs to the lock and dam in order for the fish passage to function as designed).

Navigation – This criteria specifies to maintain the functionality of recreational navigation uses (in the pool and downstream). (Note only: Neither commercial navigation nor a connection between the pool and the river downstream were in existence on Dec. 16, 2016).

Water Supply – Maintains the ability to withdraw water from the pool for all water users who depended on the pool as a water supply source.

Recreation – Includes all recreational uses in the pool and downstream of the lock and dam. (Note: The Corps includes in this process the identification/determination of any impacts to recreational facilities such as public marinas, ramps, and homeowner docks the alternative may have.

SLIDE 10
How will the Corps compare and evaluate each alternative against the criteria I just described? Shown here is an example of an evaluation matrix which is part of the Corps deliberative process from which to follow in determining a recommended plan/solution. The intent is to prohibit individual preferences from being subjectively inserted to influence an outcome.
Each alternative is assessed based on each defined and approved criteria I discussed on the preceding slide. Independent values are entered for each resulting in a total score. The risks associated with the alternatives are applied as another measure used to confirm the selection of a recommended plan.

At this time, we will transition from the Corps processes that I have covered to a more in depth discussion of the Engineering process behind our alternative analysis. The next series of engineering technical slides will discuss in detail the extensive and exhaustive work that been completed to date as we work to complete our report. The information presented will describe an introduction to our modelling effort and detail each of the final alternatives in real life like visual renderings to aid in the understanding of the concepts contained in each of them.

SLIDE 11
- The Savannah District conducted extensive hydraulic modeling of over 33 alternative scenarios ultimately narrowing the final alternatives to five:
  - Using the approved FEMA 2003 1D HEC-2 model for the 100- and 500-year flood event levels (FEMA's model for potential flood impacts to development)
  - Developed a HEC-RAS 2D model to provide increased resolution of flood impacts at the 2, 5, and 10-year flood event levels
- Detailed hydraulics analysis of permitted upstream water intake infrastructure
- Upstream bathymetric, side-scan sonar, multi-beam, and obstruction identification surveys

Coordination with NOAA/NMFS on the species and all alternatives concept designs, USFWS on the Fish and Wildlife Coordination Act Report (FWCAR), and GA and SC State Historic Preservation Offices

Project designs and impacts will also be coordinated with the Georgia and SC State Historic Preservation Offices and federally-recognized tribes to comply with the National Historic Preservation Act.

As a note, the structure is historically significant and eligible for the National Register of Historic Places because of its association with historic trends/events in American history (transportation history) and engineering. The lock and dam possesses important associations with a long-term cooperative effort by the USACE and the City of Augusta, Georgia to improve commercial navigation along the river. The dam and lock structure retains a high degree of architectural/engineering integrity. Physical changes to the lock and dam have been minimal since its completion in 1937.

1) FEMA stick figure model was not geo-referenced, built primarily for large flood events (100-year Base Flood Elevation), and relatively coarse.

SLIDE 12
2) USACE geo-referenced the FEMA model and used it for high-level screening of project alternatives, but the model was not suitable for the detailed analysis required for this project

SLIDE 13
3) It was determined that a new model would be required, focusing on the area-of-interest, from just south of NSBL&D to the Augusta Shoals 20 miles to the north.

SLIDE 14
4) 1-meter resolution LiDAR data were obtained for the overbank areas in Aiken and Richmond counties. This included the leveed area of the City of Augusta.

SLIDE 15
5) Channel bathymetry data were obtained by the Savannah District operations division, with cross sections taken on average every 1,000ft and more closely spaced around hydraulically significant features (e.g. bridges and NSBL&D).

SLIDE 16
6) A detailed bathymetric survey of the training wall near 5th Street Bridge and other submerged features was also conducted. The LiDAR, river cross sections, and training wall survey were combined to create a new terrain used in the detailed HEC-RAS 2D model. Slight modifications to the terrain were made in the vicinity of NSBL&D to reflect with-project conditions (e.g. Dam removal, rock-weir structure, bypass channel, etc.), as appropriate.

SLIDE 17
7) A 2D HEC-RAS model was created, and included a representation of the Augusta Levee. The model extents from the Shoals to ten miles downstream of the dam, and includes the leveed portion of the City of Augusta, though the levee was not overtopped for any flood events considered. An inflow hydrograph (e.g. releases from Thurmond) was used as a model input to determine water surface elevations and flooding extents for the “with” and “without-project” conditions.

SLIDE 18
8) This inundation map shows depth in the overbank areas for a hypothetical 10-year flood event. Channel capacity near Augusta is around the 2-year event. Detailed information for any location in the study area can be extracted from the model, including: water surface elevation, depth, velocity, flooding extent, number of parcels flood, etc.

SLIDE 19
- Once the model is built, we have to determine what storm events or releases from the dam we should consider.
- This slide illustrates how we define average flows in the river through the study area that pass through the lock and dam. We looked at the historic flow record from a gage that the USGS maintains at the lock and dam and we calculated that 23% of the time flows were less than 5,000 cubic feet per second (cfs), and 31% of the time flows were greater than 8,000 cfs. Therefore 5,000 cfs is the low end of average and 8,000 cfs is the high end of average.
- Flows normally fall in the middle of these two numbers. For reference, in the river today – we are close to this 5000 cfs flow condition; last week we were up much higher with all the rain we had in the upper portion of the basin.
- The lowest flows we would expect to see are closer 3600 cfs. These are rare, drought flow conditions that we don’t expect to see often.

- However, because we have a really detailed model built we can and have evaluated all of these flow conditions from the low end to the high end. Typical flows and rare flows so that we fully capture any impacts from our alternatives.
- For the purpose of graphical illustration in the next several slides the water levels for the alternatives we are considering are associated with these flow conditions of 5,000 cfs or 8000 cfs.

SLIDE 20

- This slide provides a little more insight into the river system and is a screen capture that we took from our model. The tan area on the bottom of the image describes the bottom of the channel as you move from the lock and dam on the left of the image to about 15 miles up-river in North Augusta.
- The orange band shows the water surface elevations of the pool behind the lock and dam. You can see how the lock and dam backs up the water upstream.
- You'll notice at the lock and dam this band is at its widest and as you move up-river it narrows. This narrowing as you move up river shows how the impact of the dam on the water levels is reduced as you move further and further away from the dam. Another way to describe how this wedge narrows is that the depth attenuates as you move upstream. Or the impacts of the dam itself are reduced.
- The additional lines on the graphic are the pool levels for each of the alternatives. Again, you can see how when you move away from the dam the depths attenuate and the impact of the dam itself is reduced.
- The point here is that the further upstream we move away from the dam, the more you will see a decrease in impacts to the pool level with each alternative.

SLIDE 21

- Now we will step through the final alternatives that we have spent the better part of the past year developing with the use of our computer models.
- These alternatives are all conceptual at this point. When we started this effort we began with more than 30 alternatives and we've narrowed that to 7 for final consideration.
- During our development of each of these alternatives we worked with our federal partners at NOAA/National Marine Fisheries, USFWS on the concept designs to be sure these designs were suitable for a variety of fish.
- As we move forward our project designs will also be coordinated with the Georgia and SC State Historic Preservation Offices and federally-recognized tribes to comply with the National Historic Preservation Act.

As a side note, the New Savannah Bluff Lock and Dam is historically significant, it's over 80 years old, and is eligible for the National Register of Historic Places because of it is part of our American history- from its engineering design, to how it was constructed, to the its use in transportation of goods between Augusta and Savannah. And we understand that to many it is somewhat of a monument to a way of life and the structure itself has remain largely unchanged since its completion in 1937.
So we do understand the significance of the structure both historically and how many benefit today from the pool it creates, but we also have direction in the WIIN Act to consider alternatives as we look ahead to the future.
So let's step through these alternatives shown as artist renderings of our engineering drawings.

SLIDE 22

Here we have an alternative that retains the dam and riverside lock wall with a fish passage structure on the Georgia side of the river.
This fish passage would require removal of the lock, the lock gates, and a portion of the bank adjacent to the lock.
A large portion of the park and the boat ramp would remain unaffected.
This alterative would require repairs to the lock wall and the dam itself from the gates to the extensive cracking in the concrete piers.
SLIDE 23
Under this alternative we would expect to see the depths at the 5th street Bridge to be about 11 ft. deep under a low-average flow of 5000 cfs, which is shown in the orange line.
The blue band represents the current operating conditions and these are the range of depths you would expect to see today – between 10 and 13 ft. deep.

SLIDE 24
The next alternative is a fixed crest weir. This alternative requires full removal of the lock and dam from bank to bank and down to the concrete foundation and construction of the fish passage structure up to a fixed crest weir that holds the pool in place.
This alternative dramatically changes the landscape to a more natural condition mimicking the shoals further upstream.
Again, a large portion of the park and the boat ramp would remain unaffected.

SLIDE 25
Under this alternative we would expect to see the depths at the 5th street Bridge to be about 9 ft. deep under a low-average flow of 5000 cfs, which is shown by the gray line.
Again the blue band represents the current operating conditions and these are the range of depths you would expect to see today – between 10 and 13 ft. deep.

SLIDE 26
In this alternative, fixed weir with floodplain, we have the same fish passage and weir structure in the river; requiring complete removal of the lock and dam from bank to bank to its foundation. But we also have a floodplain bench. Which is basically removal of a large portion of earth adjacent to the bank that would allow flows to pass around the structure rather than stacking behind it.
This alternative impacts the park area as well as the existing boat ramp which we would mitigate for by building a new ramp just upstream.

SLIDE 27
Under this alternative we would expect to see the depths at the 5th street Bridge to be about 10 ft. deep under a low-average flow of 5000 cfs, which is shown by the yellow line.
Again the blue band represents the current operating conditions and these are the range of depths you would expect to see today – between 10 and 13 ft. deep.

SLIDE 28
In this alternative, fixed weir with dry floodplain, we have a very similar alternative to the previous project but the elevations of the fixed weir and the floodplain bench vary. Again, this alternative requires complete removal of the lock and dam from bank to bank to its foundation.
And, this alternative impacts the park area as well as the existing boat ramp which we would mitigate for by building a new ramp just upstream.

SLIDE 29

There are three variations under this alternative, and we would expect to see the depths at the 5th street Bridge be between 8.5 and 9.5 ft. under a low-average flow of 5000 cfs, which is shown by the black, red and blue lines.

Again the blue band represents the current operating conditions and these are the range of depths you would expect to see today – between 10 and 13 ft. deep.

SLIDE 30

Our last alternative is known as the gated bypass channel.
This alternative would require complete removal of the lock and dam, construction of the fixed weir and fish passage across the river and construction of a gated structure on the Georgia side of the river that would operate to pass water during high flow events.
This alternative, again, impacts the park area as well as the existing boat ramp which we would mitigate for by building a new ramp just upstream.

SLIDE 31

Under this alternative we would expect to see the depths at the 5th street Bridge to be about 11 ft. deep under a low-average flow of 5000 cfs, which is shown by the brown line.
Again the blue band represents the current operating conditions and these are the range of depths you would expect to see today – between 10 and 13 ft. deep.

SLIDE 32

So we've looked at some of the ways that the pool level is expected to change under the various alternatives and I know there have been questions about how the shoreline or the extents of the pool may change with some of the alternatives.
A tool that we are still working on will help answer these questions. And we hope to have this available soon.
Once it is finished, this tool will allow the public to see the impacts each alternative may have on their own property or property of interest adjacent to the shoreline.
The intent is for an address to be typed into the web browser, after which the user will be directed to a website and will be able to click from a d and see how that alternative impacts that location.
We expect this to be available in advance of the release of the draft report.

SLIDE 33

Lastly, we encourage the Public and Stakeholders to visit our public website created solely for the Fish Passage feature. The website can be access at the following link:
https://go.usa.gov/xQRwS