



**DEPARTMENT OF THE ARMY**  
U.S. ARMY CORPS OF ENGINEERS  
441 G STREET, NW  
WASHINGTON, D.C. 20314-1000

AUG 30 2016

CECW-ZB

MEMORANDUM FOR ASSISTANT SECRETARY OF THE ARMY (CIVIL WORKS)

SUBJECT: Herbert Hoover Dike, Dam Safety Modification Report and Environmental Impact Statement - Final USACE Response to Independent External Peer Review

1. Independent External Peer Review (IEPR) was conducted for the subject project in accordance with Section 2034 of the Water Resources Development Act of 2007, EC 1165-2-214, and the Office of Management and Budget's Final Information Quality Bulletin for Peer Review (2004).
2. The IEPR was conducted by Logistics Management Institute and Analysis Planning and Management Institute. The IEPR panel consisted of six members with technical expertise in geotechnical engineering, engineering geology, civil engineering, structural engineering, hydraulic and hydrology engineering, economics/planning, and environmental planning/NEPA Impact Assessment and water resource planning.
3. The final written responses to the IEPR are hereby approved. The enclosed document contains the final written responses of the U.S. Army Corps of Engineers to the issues raised and the recommendations contained in the IEPR. The IEPR Report and the USACE responses have been coordinated with the vertical team and will be posted on the Internet, as required in EC 1165-2-214.
4. If you have any questions or concerns on this matter, please contact me or have a member of your staff contact Ms. Joana Saviñon, Everglades Program Manager, South Atlantic Division Regional Integration Team, at (202) 761-4241.

A handwritten signature in blue ink, appearing to read "J. Dalton".

JAMES C. DALTON, P.E.  
Director of Civil Works

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**Herbert Hoover Dike Project  
Dam Safety Modification Report and  
Environmental Impact Statement  
U.S. Army Corps of Engineers Response to  
Independent External Peer Review  
August 2016**

Independent External Peer Review (IEPR) was conducted for the subject project in accordance with Section 2034 of the Water Resources Development Act of 2007, EC 1165-2-214, and the Office of Management and Budget's Final Information Quality Bulletin for Peer Review (2004).

The goal of the U.S. Army Corps of Engineers (USACE) Civil Works program is to always provide the most scientifically sound, sustainable water resource solutions for the nation. The USACE review processes are essential to ensuring project safety and quality of the products USACE provides to the American people. The IEPR Team, consisting of Logistics Management Institute (LMI) and Analysis Planning and Management Institute (APMI), was awarded a contract by the USACE to conduct an IEPR for the USACE of the Herbert Hoover Dike Dam Safety Modification Report (DSMR), Draft Environmental Impact Statement (DEIS), and supporting documents.

The final IEPR LMI and APMI report was issued on 24 March 2016. Overall, twenty four comments were identified and documented. Of these, two are identified as having high significance, six as medium high significance, seven as medium significance, one as medium Low significance, and eight as low significance. The following discussions present the USACE Final Response to these twenty four comments.

**1. Comment – *High Significance*: USACE has confirmed that the inflow to Lake Okeechobee is 6 times greater than the outflow capacity of the St. Lucie and Caloosahatchee canals which are the primary outlets to the lake.**

This comment had one recommendation which was adopted. The comment expresses concern that consideration of spillway capacity be addressed and if it is not going to be addressed as an alternative, a detailed explanation be provided.

**USACE Response: Adopted**

**Action Taken:** The creation of a spillway for HHD has been studied extensively and has been publicly advocated for decades. As part of the HHD DSMR Section 2.11.2 Screening of System-Wide Structural risk Management Plans, the PDT evaluated the feasibility of constructing a spillway, sized to safely pass peak inflow loading events. The spillway plan was evaluated and screened out due to the vast amount of real estate required and associated infrastructure improvements that would need to be made to the existing canal and levee systems. With identification of the location of spillway discussions already within the report in Section 2.11.2 the IEPR Team concurred that no revisions were needed to the report in response to the comment.

**2. Comment - *High Significance*: USACE requirement for considering Climate Change on this multi-million dollar project is not clearly defined or discussed.**

This comment had one recommendation which was adopted. The comment expresses concern that the USACE should provide a detailed explanation in the report as to why considering Climate Change was not required and why the USACE did not address it in the report.

**USACE Response: Adopted**

Section 5.7.5.5 was added to the DSMR to provide uncertainty evaluation regarding climate change. During discussions with the IEPR Team it was agreed that the modeling utilized to analyze the potential future storm event loading from the Standard Project Flood event provided climate variation risk based analysis for HHD. However, Future Periodic Assessments (every 10-years) will re-baseline the risk assessment and incorporate the latest available hydrologic conditions based on realized climate change. If risk looks to be trending higher, a suggestion at that time will be made whether to supplement the DSMR. Future evaluations of the HHD Dam will take place at prescribed intervals as established by Dam Safety Guidelines.

**3. Comment - *Medium High Significance*: The seepage analyses conducted for the project evaluation did not include the effects of infiltration attributable to precipitation falling on the pervious embankment slopes.**

This comment had one recommendation which was adopted. The comment expresses concerns that a sensitivity analysis be conducted on several cross-sections to evaluate whether the inclusion of a reasonable value of infiltration would significantly change the results of the analyses.

**USACE Response: Adopted**

A sensitivity analysis was conducted on a typical segment of HHD. The analysis was discussed with the IEPR Team and the conclusions drawn were that the analysis eliminated one area of uncertainty and confirmed that the influence of infiltration would not impact the overall results of the seepage analysis (the seepage analysis is an appendix to the Herbert Hoover Dike Risk Reduction Assessment). After discussing the sensitivity analysis with the IEPR Team they concurred that no revisions were needed to the report based on the comment.

**4. Comment - *Medium High Significance*: The creation of a stochastic hydrology extrapolation repeatedly refers to a desired 10,000-year model of events.**

This comment had one recommendation which was not adopted. The comment expresses concerns that this explanation be presented early in the report and to use different terminology than "10,000 years" throughout the document. We understand it is intended to be a probabilistic projection, not an analysis of 10,000 years into the future.

### **USACE Response: Not Adopted**

After discussing the report with the IEPR Team and explaining that the recommended explanation was already presented on Page 1-3 of the Hydrologic Hazard Assessment Report the IEPR Team concurred that no revisions were necessary in the report in response to this comment.

### **5. IEPR Comment - *Significance – Medium High*: Temporary bypass pumping will be used to maintain the operational function of the culvert during the construction period.**

This comment had one recommendation which was adopted. The comment expresses concerns that since the purpose of the culverts is to provide flood protection, it is important to maintain this operational function during construction, particularly where multiple culverts will be under construction at the same time. Develop contingency plans for maintaining bypass pump operating capability during power outages at culvert construction sites.

### **USACE Response: Adopted**

The rehabilitation of the HHD Culverts were authorized separately in the HHD Culvert Letter Report dated March 2011. The contracts associated with the authorized work contain requirements and plans for maintenance of permitted culvert function and flows which are included as necessary for each culvert replacement construction contract. Each construction contractor is responsible for maintaining specified temporary flow bypass system functional requirements. The culvert contracts include provision for by-pass flows and back-up power systems when appropriate. Since the culverts were separately approved and construction is in-progress, they were assumed to be a completed portion or existing condition of HHD for purposes of the DSMR the IEPR Team concurred that no revision to the DSMR in response to this comment was necessary.

### **6. IEPR Comment - *Medium High Significance*: There is no description of how the USACE determined the number of culverts that can be replaced concurrently and still be able to provide adequate flood protection during a large storm event that might occur during construction.**

This comment had one recommendation which was not adopted. The comment expresses concerns to consider using a risk assessment or other method to determine the culvert replacement sequence and the number of culverts that can be under construction simultaneously while maintaining an adequate flood control capability.

### **USACE Response: Not Adopted**

The order of replacement is based on risk and other factors (sponsor/stakeholder coordination, site access, etc.), but not temporary flow bypass requirements. The rate of replacement is

primarily constrained by funding. As culvert replacements were previously approved in 2011 no revisions were made to the DSMR in response to this comment.

**7. IEPR Comment - *Medium High Significance*: The adequacy of the project construction schedule could not be determined because the construction schedule was not provided in the review documents.**

This comment had two recommendations, both were adopted and discussed below. The comment express concerns that the construction schedule documentation has not been provided to allow a reasonable assessment of the project construction schedule.

**USACE Response: Adopted**

The IEPR panel recommended 1) the construction schedule should be included in the project documentation package. At this stage of DSMS development, a detailed construction schedule is not available. The construction schedule from the cost estimate was included in Appendix E. The IEPR panel recommended 2) the construction schedule should be independently peer reviewed. During the Type II IEPR of the Detailed Design, the detailed construction schedule will be peer reviewed.

**8. IEPR Comment - *Significance – Medium High*: The adequacy of the project risk analysis and risk management planning could not be determined because the Cost and Schedule Risk Analysis Report was not provided in the review documents.**

This comment had two recommendations, both were adopted and discussed below. The comment expresses concerns that the Cost and Schedule Risk Analysis Report documentation has not been provided to allow a reasonable assessment of the project risk analysis and risk management planning.

**USACE Response: Adopted**

The IEPR panel recommended 1) the Cost and Schedule Risk Analysis Report should be included in the project documentation package. The Cost and Schedule Risk Analysis Report was not available at the time of the IEPR review. The Cost and Schedule Risk Analysis Report was added to the DSMR Report upon cost certification in Appendix B as Attachment B. The IEPR panel recommended 2) the Cost and Schedule Risk Analysis Report should be independently peer reviewed. The Cost and Schedule Risk Analysis will be reviewed during the final ATR review and will be peer reviewed and certified by USACE Cost Engineering Mandatory Center of Expertise reviewers that are separate from the PDT at that time. Also, during the Type II IEPR of the Detailed Design, the Cost and Schedule Risk Analysis will be independently peer reviewed.

**9. IEPR Comment - *Medium Significance*: As discussed at the mid-point conference, we understand there were other scenarios for tropical storms considered than just those that**

**were described as the “mean amount of time between historical tropical storm events is 145.7 days.”**

This comment had two recommendations, both were not adopted and discussed below. The comment expresses concerns that the other scenarios for tropical storms considered were not included in the documentation.

#### **USACE Response: Not Adopted**

The IEPR panel recommended 1) considering updating the reference on Page 3-28 of the Hydrologic Hazard Assessment and further state that there was also modeling of multiple tropical storm events in shorter time periods. Section 3.3.5 of the Herbert Hoover Dike Hydrologic Hazard Assessment discusses that tropical storm arrivals are modeled as a seasonally dependent stochastic process (Poisson process) with a mean arrival rate of 145.7 days, and an index of dispersion of 1.34. This process leads to a variable storm frequency that is intended to model the variable nature of storm arrivals. This process produces both years with little storm activity and years with more frequent storm activity. The recommended information is already provided in the Hydrologic Hazard Assessment Report. Specific locations in the report include Section 3.3.5, Table 3-12, Figure 3-17, and Figure 3-39. The IEPR panel recommended 2) the results of the evaluation of tropical storms that were evaluated on a more frequent basis should also be addressed. There is only one scenario, namely the occurrence of tropical storms was modeled as a random process. The recommended information is already provided in the Hydrologic Hazard Assessment Report. Specific locations in the report include Section 3.3.5, Table 3-12, Figure 3-17, and Figure 3-39.

**10. IEPR Comment - *Medium Significance*: Using jet grouting at several locations on HHD that have difficult infrastructure situations will require assurances that the method is implemented successfully to prevent leakage and seepage.**

This comment had four sections: 1) Pump Station S-236, 2) US Sugar Raw Water Intake, 3) Lock S-310 and 4) Lock S-77, with a total of ten recommendations.

#### **Pump Station S-236**

This section of the comment included four recommendations, three were adopted and one was not adopted, as discussed below.

#### **USACE Response: Adopted**

The IEPR panel recommended 1) considering access restrictions when developing final designs and specifications for jet grouting under the discharge pipes. Preconstruction Engineering and Design phase will further develop this connection detail. The IEPR panel recommended 2) backfilling over the pipes may be required to provide drill access to the areas between the pipes for jet grouting and avoid overloading the existing discharge pipes. During construction the fill

will be placed to several feet above the pipes before passing heavy equipment over the pipes. The IEPR panel recommended 3) considering identification of methods for verification testing of jet grouting to ensure a continuous cutoff wall under the pipes. Verification testing will consist of coring and in-place permeability testing. If the tests show concern for effective permeability then cores will be angled under the pipes to verify continuity. In addition, the test section would be constructed in an area away from the existing pipes that would allow verification testing of the column overlap area that would be below the existing pipes in the test section. The IEPR Team concurred that no revision to the DSMR in response to this comment was necessary.

**USACE Response: Not Adopted**

The IEPR panel recommended 4) full scale field tests and/or test sections should be required to verify assumed construction parameters and performance. A test section is being completed as part of the Herbert Hoover Dike, Reach 1 Jet Grout cut off wall closure contract being awarded in FY16. In addition to a test section, this contract will include cutoff wall closure to 4 concrete structures that penetrate the embankment and will construct jet grout wall in geology very similar to that encountered in the area of interest for this DSMR. Data collected from this contract will be used to verify the construction parameters and performance. As stated in Appendix B, Section B.9.2 an additional demonstration section will be required for each new contract.

**US Sugar Raw Water Intake**

This section of the comment included three recommendations, all of which were adopted as discussed below.

**USACE Response: Adopted**

The IEPR panel recommended 1) consideration to locate the seepage collar closest to the lake by open excavation. Preconstruction Engineering and Design phase will further develop this connection detail. The IEPR panel recommended 2) consideration to locate the alignment of the pipes by open excavation where they are nearest the ground surface on each side of the dike. Accurate location of the pipes has already been completed using soft dig. The locations will again be confirmed during construction. Bi-directional jet grouting will then be used to construct cutoff wall under the pipes. The IEPR panel recommended 3) consideration to use utility locating devices or ground penetrating radar to identify the alignment of the pipes and the concrete collars. During Preconstruction Engineering and Design phase, the use of ground penetrating radar and other utility locating devices and or procedures will be reviewed for inclusion in specifications. The IEPR Team concurred that no revision to the DSMR in response to this comment was necessary.

**Lock S-310**

This section of the comment included two recommendations, both were adopted as discussed below.

**USACE Response: Adopted**

The IEPR panel recommended 1) to work with jet grouting contractors to develop a procedure to achieve good contact between the soilcrete column and the steel sheet piling. SAJ is working with jet grout expert Dr. Joe Kauschinger to develop these plans. The IEPR panel recommended 2) that the drawings for Lock S-310 should be examined closely to determine the accurate location of the existing steel sheet piling cutoff wall under the structure. As built will be examined closely to determine accurate location of sheet piles. Specifications will then require the contractor to locate the edge of the concrete structure by probing to confirm its location prior to jet grouting. The design includes redundant jet grout elements along the alignment of the jet grout due to the presence of timber piles and difficulties confirming as-built dimensions of jetgrout constructed cutoff wall. Continuous observation by engineering staff during construction will be used to document extraction rates and grout injection pressures. This data will be used along with test section cores and excavations, and cores in the connection columns to verify connectivity with the structure. The IEPR Team concurred that no revision to the DSMR in response to this comment was necessary.

**Lock S-77**

This section of the comment included one recommendation which was adopted as discussed below.

**USACE Response: Adopted**

The IEPR panel recommended working with jet grouting contractors to develop a procedure to achieve good contact between the soilcrete column and the steel sheet piling. The process of jet grouting will be reviewed with contractors and will be monitored as required during construction to assure contract compliance. The IEPR Team concurred that no revision to the DSMR in response to this comment was necessary.

**11. IEPR Comment - *Medium Significance*: An evaluation of the adequacy of the project cost estimate could not be made because the cost estimate was not provided in the review documents.**

This comment had two recommendations, both were adopted as discussed below. This comment expresses concerns that MII TSP Cost Report was omitted from the DSMR. The cost estimate documentation has not been provided to allow for a reasonable assessment of the project cost estimate.

**USACE Response: Adopted**

The IEPR panel recommended 1) the MII TSP Cost Estimate should be included in the project documentation package. The MII TSP Cost Estimate was not available at the time of the panel review, but has subsequently been added to the report in Appendix B.9.2. The IEPR panel recommended 2) the MII TSP Cost Estimate should be independently peer reviewed. During the Type II IEPR of the Detailed Design, the MII TSP Cost Estimate will be independently peer reviewed.

**12. Comment - *Medium Significance*: It is not clear if the construction contractor will be required to install a test section of the cutoff wall before being permitted to continue with production work.**

This comment included one recommendation which was adopted as discussed below. This comment expresses concerns that requires a demonstration by the contract of the proposed construction method for the cutoff wall prior to permitting production work.

**USACE Response: Adopted**

As with previous contracts to build cutoff wall at HHD, a demonstration section will be required for each contractor and each method of construction. A second notice to proceed is issued upon verification of a successful demonstration section. This was added to the DSMR Engineering Appendix text in Section B.9.2 for clarity.

**13. Comment - *Medium Significance*: The DSMR EIS does not provide sufficient detail on existing and Future Without Action Conditions (FWAC) for the reader to fully evaluate and understand existing natural resources and the impacts associated with selection of the tentatively selected plan (TSP).**

This comment included ten recommendation, all of which were not adopted as discussed below. After discussion and further considerations, the IEPR team concurred with USACE responses below to the specific questions within the comment. Furthermore, public and agency comments regarding the detail on the FWAC was explained in the comment/response matrix in Appendix C.4.

**USACE Response: Not Adopted**

The IEPR panel recommended 1) the Draft Environmental Impact Statement text “describes existing environmental resources of the areas that would be affected on the HHD dike” if any of the alternatives were implemented. This implies that the study area is the dike area itself where in fact the NEPA analysis should address any downstream conditions that may be affected as well. It is USACE determination that the current condition of the estuaries does not need to be discussed with the current freshwater releases under LORS 2008, because the conditions will not change based on any of the alternatives. Therefore, none of the alternatives would have any direct or indirect effects on the estuaries or water conservation areas. However, for clarity the following language was added to Section 3: “It is assumed the LORS

2008 is the operating regulation schedule for existing conditions, future without project conditions, and for all alternatives. Therefore, the estuaries are expected to have no direct or indirect changes from existing to a future with-project condition and are not discussed within this EIS.” The IEPR panel recommended 2) the significant description is provided of historical berm construction, etc. but the reader would benefit from an understanding of regional geology responsible for formation of the limestone basin within which Lake Okeechobee sits. That historical understanding of natural conditions provides a basis for understanding how man-altered the present lake is. It also would help the reader understand the basis for statements elsewhere in the DSMR that hydrological inputs to the lake are six times the output. The EIS provides detailed information on the geology of each of the common inundation zones that provide the reader an understanding of Lake Okeechobee. However, within the DSMR, there is more detailed information on Geology in the Geology Appendix B-1. USACE has demonstrated that conditions of Lake Okeechobee and HHD are man-made, and the inputs vs. outputs to the lake do not depend on the historical geology of the area. The IEPR Panel recommended 3) the discussion of soil types lacks a figure that would enable the reader to better understand their distribution in the study area in relation to the proposed project. The soils in the area do not significantly affect the project study, and since the footprint is artificial material within the embankment, a soils map would not add significant value to understanding their distribution. Soil types in the surrounding area would not be impacted by any of the alternatives. The IEPR panel recommended 4) the text does not adequately address how existing water quality downstream (all the way to the Bay) is affected by current water management policies designed to relieve pressure on the berm and thereby reduce risks to public safety. This is important to understand the implications of the TSP and other alternatives at improving long term regional water quality. The downstream water quality would not be significantly impacted by the alternatives considered in this EIS. An alternative regulation schedule would be developed and analyzed under a separate EIS, in which the downstream water quality impacts associated with lake operations would be addressed. The IEPR panel recommended 5) the document does not address the long term water quality impacts and impacts on wetlands and wildlife from continuing present lake management policies without implementation of the TSP or other alternatives. As a result, it may be more difficult for the public to fully understand the need for the project. A figure showing the extent of different wetland/habitat types should be presented as a basis for understanding potential acreage impacts from the TSP. The following language was added to section 3.7 for clarity: “High quality wetland habitat can be found in the extensive littoral zone covering the western side of Lake Okeechobee as snail kite critical habitat, also the littoral zone).” The IEPR panel recommended 6) the discussion is excellent and focuses on endangered species as summarized by the U.S. Fish and Wildlife in Appendix E, but their analysis focuses entirely on Lake Okeechobee and there is no discussion of regional wildlife resources, species lists, etc. that would enable the reader to understand ultimately whether any of the alternatives differ in terms of their impacts. The USFWS provided concurrence on February 22, 2016 with our determinations on ESA species as a result of the DSMS. For clarity, this letter will be included in the Final EIS. Regional wildlife is described substantially in the Central Everglades Planning Project, which provides a regional view of what is in the area. Each alternative would have the same effect on species, because all alternatives include work within the Federal right of way. Because there are no changes to the

lake operations schedule, there would be no effect on regional species. The IEPR panel recommended 7) a graphic showing the extent of nearby sites would be helpful in interpreting their location relative to future proposed activities. Sites cannot be distributed to the public. Coordination with the tribes and SHPO (located in Appendix C) is done separately so that the location of sites is not publicly known. The IEPR panel recommended 8) the text states “existing conditions for the ecosystems south of HHD were thoroughly discussed in the Central Everglades Planning Project EIS”. The pertinent material from that EIS should be brought forward to provide a regional discussion, rather than requiring the public to look for it. As guidance, NEPA does not intend a document to be encyclopedic, but more detail should be provided than is within the present text, which describes species present in generalities such as “aquatic invertebrates” and “small fish, reptiles and amphibians.” Because the resources south of HHD would only be impacted if there were a breach, USACE has determined that it was reasonable to reference the extensive CEPP document that focused on all of the areas south of the lake. All alternatives would not have any net effect on resources south of the lake because the only change is fortifying the dike, therefore, the focus remained on resources likely to be impacted by any of the alternatives. The IEPR panel recommended 9) a figure showing the extent of different wetland/habitat types should be presented as a basis for understanding potential acreage impacts from the TSP. Water quality would be analyzed/assessed under a separate NEPA document for any change in a regulation schedule. This NEPA document would include an array of alternatives for screening and analysis. For this current EIS, water quality is assumed to be the same as current conditions, because all alternatives would affect the resource the same. Wildlife and wetlands would be temporarily affected by construction, but would have the same overall direct and indirect effects due to all alternatives. Alternative 4 would have an internal drainage system, which would incur wetland impacts due to work in the toe ditches. However, the TSP and all other alternatives include a cutoff wall, in which construction would take place within the centerline of the existing embankment. The IEPR panel recommended 10) the discussion seems focused primarily on “if the dike were to fail” as opposed to what would happen in the future without the project, specifically allowing high nutrient freshwater to flow into the Bay during severe storm events. It is USACE determination that the current condition of the estuaries does not need to be discussed with the current freshwater releases under LORS 2008, because the conditions will not change based on any of the alternatives. Therefore, none of the alternatives would have any direct or indirect effects on the estuaries or water conservation areas. However, for clarity the following language was added to Section 3: “It is assumed the LORS 2008 is the operating regulation schedule for existing conditions, future without project conditions, and for all alternatives. Therefore, the estuaries are expected to have no direct or indirect changes from existing to a future with-project condition and are not discussed within this EIS.”

**14. Comment - *Medium Significance*: The DSMR EIS does not provide sufficient detail on FWAC and cumulative project impacts for the reader to fully understand the relationship of the tentatively selected plan (TSP) to other regional initiatives geared at managing water quality, restoring wetlands and protecting wildlife, water quality, recreation and other resources of the region.**

This comment included one recommendation, which was adopted as discussed below. The comment expresses concerns that the EIS should describe in greater detail in relation to the various regional initiatives so that the reader understands the importance of this project in a regional context.

**USACE Response: Adopted**

The USACE has determined that the regional importance of this project is adequately described, and the TSP is described in Section 2. However, a more robust description of Comprehensive Everglades Restoration Plan actions are included in the cumulative effects section (EIS Section 5.25) with Figure 5-1 to help the reader understand the discussion and impact analysis.

**15. Comment - *Medium Significance*: The DSMR EIS does not give sufficiently detailed consideration of climate change on the future ecology of Lake Okeechobee and surrounding region, both with and without implementation of the tentatively selected plan.**

This comment had one recommendation, which was not adopted as discussed below. The comment expresses concerns to include greater detail in discussing climate change in the form of more frequent and severe storm events that may only further exacerbate conditions of downstream impact to estuarine wetlands, making it more imperative that the District act to implement the TSP or another reasonable alternative.

**USACE Response: Not Adopted**

Climate change is specifically addressed in Section 6 of the EIS. During discussions with the IEPR Team it was agreed that the modeling utilized to analyze the potential future storm event loading from the Standard Project Flood event provided climate variation risk based analysis for HHD. However, Future Periodic Assessments (every 10-years) will re-baseline the risk assessment and incorporate the latest available hydrologic conditions based on realized climate change. If risk looks to be trending higher, a suggestion at that time will be made whether to supplement the DSMR. As future evaluations of the HHD Dam will take place at prescribed intervals as established by Dam Safety Guidelines. Subsequent to completion of the EIS and after the completion of the IEPR process, additional information was added to Section 5.7.5.5 of the DSMR to provide background information and clarity to the reader.

**16. Comment - *Medium Low Significance*: The USACE should conduct period monitoring of downstream development to assess if risk is changing.**

This comment had one recommendation, which was adopted as discussed below. This comment expresses concerns to include greater detail in discussing climate change in the form of more frequent and severe storm events that may only further exacerbate conditions of downstream impact to estuarine wetlands, making it more imperative that the District act to implement the TSP or another reasonable alternative.

### **USACE Response: Adopted**

The recommendation is part of the existing 10 year periodic assessment of USACE dams: “which is a semi quantitative risk assessment that evaluates failure modes and risk estimates based on a review of the performance history and re-estimates consequences based on changes in downstream land use”, and as such is already utilized and adopted by USACE in ER-1110-2-1156.

### **17. Comment - *Low Significance*: The report does not make any mention of slope stability as a potential failure mode.**

This comment had one recommendation, which was adopted as discussed below. The comment expresses concerns that a paragraph be developed and included in the report which describes the results of the previous stability analyses and the reasons that slope stability was not considered as a potential failure mode for purposes of the development of remedial measures.

### **USACE Response: Adopted**

A description of potential failure modes that were not carried forward into the quantitative risk assessment was added to the DSMS report in section 5.3 Screened Potential Failure Modes, including the reasons why these potential failure modes were not considered further.

### **18. IEPR Comment - *Low Significance*: The explanation for the use of the Monte Carlo Reservoir Analysis Model (MCRAM) that was developed by the USACE Risk Management Center and was approved for a one-time use for this study was understood better after final completion of the readings.**

This comment had one recommendation, which was not adopted as discussed below. This comment expresses concerns that due to the magnitude of the data to be reviewed, the historical background led to initial confusion about the evolution and justification of the final modeling until all of the reading was completed. This will be left to the USACE to determine if they choose to do some editorializing or not to help avoid similar confusion as the Project proceeds forward.

### **USACE Response: Not Adopted**

USACE reviewed the report and the discussions of the USACE Risk Management Center MCRAM model. The discussion is developed with the intent of the reader completing the discussion presented to understand the overall presentation and how the model was used. As such, USACE does not feel that additional editorializing in the text is needed. The existing text presents the information in a logical discussion progression and is adequate for this report.

**19. Comment - *Low Significance*: The DSMR does not provide an estimated date for the replacement by the Florida Department of Transportation of the SR78 highway bridges over Harney Pond, Indian Prairie and Kissimmee River.**

This comment had one recommendation, which was adopted as discussed below. This comment expresses concerns to include in the report a confirmation of contact with the Florida Department of Transportation and the estimated bridge replacement dates

**USACE Response: Adopted**

USACE has held discussions with the FDOT on the need to address the changes needed to reduce risk when the SR78 bridges are replaced. However based on FDOT criteria for bridge replacement there is no current estimated replacement period for the bridges in question. USACE will continue to work with FDOT regarding this matter. The recommendation for FDOT bridge replacement with higher elevations has been included in the DSMR section 2.10.1.5, 2.13.2.2, 2.13.8, and 6.1.2.4; however, FDOT has its own budget for this work in the future but currently is not included in a future work plan. Coordination was conducted with the FDOT during the EIS NEPA process. This coordination is documented in Appendix C .5 Public and Agency Comment Letters and Emails. The IEPR team concurred with this analysis and subsequently no changes to the report were warranted.

**20. Comment - *Low Significance*: Sea level change, subsidence, or modified agriculture policy could eliminate the supposed consequences of a possible HHD failure.**

This comment had two recommendations, both were adopted as discussed below. This comment expresses concerns that sea level change, subsidence and elimination of subsidies for sugar cane could result in the reduction or elimination of the consequences which support the proposed investment recommendation.

**USACE Response Adopted**

The IEPR panel recommended 1) providing a section on the impact sea level change, subsidence and agriculture policy could have on the consequences described and viability of the investments if Everglades Agricultural Area were compromised. The current consequences assessment is based on the existing conditions and the most reasonable estimate of future conditions. However, it is true that the various noted factors (sea level change, a new agriculture policy) could impact the consequences. If any of these impacts are observed, future studies will need to incorporate them into an updated consequences analysis. The USACE periodic assessments (PAs) that occur every ten years will be one avenue to do this. Section 5.7.5.5 has been added to the main report to provide an uncertainty evaluation of climate change scenarios. The IEPR panel recommended 2) a description of probable future considering these potential changes. There is enormous uncertainty about future land use changes, neither dramatic increases nor decreases in the population at risk were assumed to be part of the FWAC, as described in Section 4.2.4 of the main report and Section 4 of the

Consequences Appendix (Appendix C) Federal action has been justified based on existing levels of development (with some modest population growth assumed over time). Given the uncertainty this is a reasonable approach. Also, it should be noted that the consequences are actually lower in the FWAC than in the existing condition (due to improved evacuation warning systems). A reduction in potential future consequences has already been factored into the analysis. Thus the current FWAC is reasonable for this study and no additional revisions were made to the DSMR in response to this comment. The IEPR Team concurred that sufficient explanation was provided in the DSMR and no additional revisions to the report were necessary.

**21. Comment - *Low Significance*: DAMRAE and FIA models must simulate the risk and consequences for the HHD impact area.**

This comment had two recommendations, both were not adopted as discussed below. This comment expresses concerns that AALL and APF are so critical to the investment decision, it would provide clarity to understand how accurately the model simulates the HHD impact area.

**USACE Response: Not Adopted**

The IEPR panel recommended 1) to demonstrate the sensitivity of the model to deterministic assumptions like the 91% fatality among those “caught.” Sensitivity analyses have confirmed that varying this fatality rate alone would have a negligible impact of the results. After discussions with the IEPR team it was agreed that it was not necessary to revise the report with more sensitivity analyses. The best, worst, and expected case scenarios contained in the model already provide a wide range of possible outcomes. The IEPR panel recommended 2) uncertainty could be reduced through the use of MOBILE LIDAR to enhance structure location and height. Depending on the breach location and loading condition, some results are sensitive to the location and elevation of structures subject to flooding. However, the model inputs are already sufficiently precise for this study. Structure locations have been modified based on detailed aerial imagery (using GIS tools such as ArcMap as well as Google Earth). Also, first floor elevations are based on existing terrain data and detailed site visit notes and pictures. The currently adopted level of detail is appropriate for the study; however, the Mobile LiDAR will be considered for future analysis updates.

**22. Comment - *Low Significance*: Improvements to accomplish reductions in Average Annualized Life Loss (AALL) should be implemented as the first priority.**

This comment had one recommendation which was adopted as discussed below. The comment expressed concerns with revising the implementation plan to reflect AALL priority.

**USACE Response: Adopted**

The implementation plan in Section 8 of the DSMR has been amended to reflect that the AALL work in segments 14A and 14B will begin as soon as possible.

**23. Comment - *Low Significance*: Assumptions about “Warning Issuance Times” are speculative.**

This comment had one recommendation, which was adopted as discussed below. The comment expresses concern with the review expectations for “warning time” on all over-wash and overtopping segments where the recommendation might be modified.

**USACE Response: Adopted**

Warning time assumptions have been reviewed for overwash and overtopping scenarios. The team concluded that the assumptions were still reasonable and appropriate. The Consequence Appendix explains the assumptions contained in Section 8.7 of the report. These assumptions were reviewed during discussions with the IEPR Team and determined to be adequate by the IEPR Team.

**24. Comment - *Low Significance*: Additional definition of As-Low-As-Reasonably-Practicable (ALARP) is needed.**

This comment included one recommendation, which was adopted as discussed below. The comment expresses concerns to include an expanded definition or description of ALARP to disclose fully that there is no “balancing” of dike improvement costs and incremental economic or environmental outputs, but, instead, there is a recognition of “disproportionate” cost for the next increment of risk reduction.

**USACE Response: Adopted**

The discussion of application of AALL and then the added application of ALARP considerations is utilized in the existing section 4.1.1 of the DSMR. Additional discussion was added in DSMR Section 8.7.