



DEPARTMENT OF THE ARMY  
U.S. ARMY CORPS OF ENGINEERS, GALVESTON DISTRICT  
2000 FORT POINT RD  
GALVESTON, TEXAS 77550

## RECORD OF DECISION

Department of the Army Permit Application No. SWG-2016-01027

### Dow Chemical Company Harris Reservoir Expansion Project

This document constitutes the Clean Water Act (CWA) Section 404(b)(1) guidelines evaluation, as applicable; public interest review; and statement of findings for the subject application.

## 1 Introduction and Overview

This document constitutes the U.S. Army Corps of Engineers (USACE or the Corps) Galveston District's record of decision (ROD) and review and compliance determination under 1) the National Environmental Policy Act (NEPA) of 1969, as amended; 2) Section 10 of the Rivers and Harbors Act of 1899 (33 United States Code [USC] 403); 3) Section 404 of the CWA of 1972, including the 404(b)(1) guidelines; and 4) the public interest review in accordance with 30 Code of Federal Regulations (CFR) 320.4(a) for the Harris Reservoir Expansion Project (Project) proposed by Dow Chemical Company (Dow or the Applicant).

The Project requires authorization in accordance with Section 404 of the CWA because of the discharge of dredged or fill material into waters of the United States (WOUS) (33 USC 1344). In accordance with NEPA, as defined in 40 CFR 1501.5, the Corps acted as the lead agency on the preparation of the draft environmental impact statement (DEIS) and final environmental impact statement (FEIS). In making this permit decision, the Corps relied on the FEIS (USACE 2023); supporting information, data, and analyses; and information contained in the Applicant's Department of the Army (DA) CWA Section 404 Permit application and the Applicant's CWA Section 401 Water Quality Certification dated September 19, 2023 (Section 401 of the CWA and in accordance with 33 CFR 320.4(a) public interest review). In doing so, the Corps considered the possible consequences of the Applicant's Preferred Alternative in accordance with regulations published in 33 CFR 320 through 332 and 40 CFR 230 and considered the stated views of interested agencies and the public regarding the Project. Dow has selected the proposed layout identified in the FEIS as Alternative 2B as their preferred alternative. A detailed description of the Project can be found in Section 2.3 of the FEIS.

### 1.1 Applicant

Dow Chemical Company  
Texas Innovation Center  
332 State Highway 332 East  
Lake Jackson, Texas 77566

## **1.2 Activity Location**

The Project site consists of 2,533 acres located south of Houston, Texas, approximately 8 miles northwest of the City of Angleton, Texas. The Project site is adjacent to the eastern bank of the Brazos River, and a portion of Oyster Creek runs through the eastern portion of the Project site. See the FEIS for the full extent of the Project.

## **1.3 Description of Activity Requiring Permit**

Dow is proposing to construct and operate an approximately 51,000-acre-foot (AF) off-channel reservoir adjacent to the existing Harris Reservoir that will have a surface area of 1,929 acres within a 2,533-acre Project site in Brazoria County, Texas. Alternative 2B, the Alternative Reservoir Layout alternative (the Project and the Applicant's Preferred Alternative) includes a new intake and pump station along the Brazos River adjacent to and west of the proposed reservoir site and an outfall into Oyster Creek adjacent to and east of the proposed reservoir site. The proposed reservoir will improve the reliability of water supply during drought for integrated chemical manufacturing facilities at Dow's Texas Operations and will improve the reliability of the water supply for other industrial, community, and potable water users that rely on Dow's water supply. Water will be pumped from the Brazos River into the reservoir for storage, be discharged by a baffle drop structure into Oyster Creek, and then flow downstream to the Lake Jackson pump station for use at Dow's facility.

The proposed reservoir will be operated in conjunction with the existing Harris Reservoir located immediately to the south and with the existing Brazoria Reservoir located 21 miles downstream. The proposed reservoir will be used mainly as additional storage to the existing two reservoirs but will become the primary reservoir during drought conditions. The proposed reservoir will operate with the existing Harris and Brazoria Reservoirs in a manner similar to current operations and will increase total available water storage from 68 days of water to 180 days.

Dow submitted an application to the Corps for a DA permit pursuant to Section 10 of the Rivers and Harbors Act of 1899 (33 USC 403) and Section 404 of the CWA (33 USC 1344) (Permit SWG-2016-01027) for the discharge of dredged or fill material into WOUS. The Applicant's Preferred Alternative includes the discharge of dredged or fill material into 15.78 acres of wetlands and 32.67 acres of waterbodies.

### **1.3.1 Proposed Avoidance and Minimization Measures**

Most wetland and stream impacts within the footprint of the reservoir are unavoidable. Wetlands mapped outside the limits of disturbance will be flagged to avoid any unintentional disturbance. The embankment and appurtenant features are designed to minimize their footprint within aquatic resources. Best management practices (BMPs) will be in place during construction to ensure that temporary impacts to wetland are minimized and restoration of temporary impacts will be successful.

### **1.3.2 Proposed Compensatory Mitigation**

The Project includes plans for mitigating impacts via restoration projects on-site on Oyster Creek and off-site on Big Slough. Two of the three Oyster Creek projects (referred to as Oyster Creek Projects 1 and 2) are intended to provide restoration and enhancements of the plant habitats and communities along the riverbank (riparian area). The Oyster Creek restoration

includes creating flat or shallowly sloped areas above the bankfull height to slow high-velocity flows during storm events (bankfull benching), 100-foot buffer preservation, and buffer reestablishment up to 200 feet.

- The Oyster Creek Project 1 will be located on a 3,600-linear-foot unnamed tributary to Oyster Creek and includes floodplain enhancement and compensatory mitigation.
- The Oyster Creek Project 2 will be located on a 12,865-linear-foot segment of Oyster Creek and includes floodplain enhancement and compensatory mitigation.
- The Big Slough mitigation site, an approximately 1,100-acre area located on Dow property 7 miles east of Lake Jackson near the Brazoria National Wildlife Refuge, will include approximately 6.4 miles of Big Slough and adjacent riparian areas (1,113 acres) that will be restored to increase stream function.

Dow has prepared a compensatory mitigation plan that includes stream and wetland restoration and enhancement/establishment at Big Slough (See FEIS Appendix G ). Based on the Galveston District's interim hydrogeomorphic wetland functional assessment, the compensatory mitigation plan includes maintenance of plant and animal communities (MPAC), removal and sequestration of elements and compounds (RSEC), and temporary storage of surface water (TSSW).

The Big Slough mitigation site will improve 33,400 linear feet (155 acres) of stream. In addition, the mitigation site will establish 8.86, 8.11, and 7.85 TSSW, MPAC, and RSEC non-forested wetland credits, respectively; establish 4.85, 5.96, and 4.75 TSSW, MPAC, and RSEC forested wetland credits, respectively; and enhance 0.59, 3.48, and 0.68 TSSW, MPAC, and RSEC forested wetland credits, respectively.

## **1.4 Existing Conditions and any Applicable Project History**

The 2,533-acre Project site is owned by Dow and located in rural Brazoria County south of Houston, approximately 8 miles northwest of the City of Angleton, and approximately 5 miles west of State Highway 288. The Project site is bordered by the Brazos River to the west, Oyster Creek to the east, the existing Harris Reservoir to the south, and Texas Department of Criminal Justice (TDCJ) Ramsey Prison Facility land to the north (see Figure 1.1-2 in the FEIS). The southern boundary of the Project site abuts Harris Reservoir Road (County Road [CR] 34). The northern portion of the Project site can be accessed from a dirt road on the prison property to Ramsey Bridge. The site is currently leased to the TDCJ for agricultural farming and cattle grazing. The Project site is within the floodplain of the Brazos River and Oyster Creek. The Project site contains 21.38 acres of delineated wetlands and 109,338 linear feet (74.10 acres) of waterbodies. The surrounding area is mostly agricultural fields and grazing pastures and some scattered residences.

## **2 SCOPE OF REVIEW**

### **2.1 Determination of Scope of Analysis for the National Environmental Policy Act**

The scope of analysis includes the specific activity requiring a DA permit. The Corps' scope of analysis or Permit Area is the same as the Project site, which is defined as the areas comprising

WOUS that are directly affected by the Project. The Corps considered direct and indirect impacts during the CWA Section 404 review, as well as other potential environmental, social, or economic effects from the Project. The direct and indirect impacts to jurisdictional WOUS will occur within the footprint of the proposed reservoir. These impacts will result from discharge of fill material into, and inundation of, jurisdictional wetlands and other WOUS. Impacts will occur where upland areas become inundated by reservoir creation and from construction of the dam embankment and permittee-responsible mitigation areas.

## **2.2 Determination of the Corps Action Area for Section 7 of the Endangered Species Act**

The Action Area contains the Project workspaces and areas outside the immediate Project workspaces where potential effects of the Project may have potential consequences to listed species or designated critical habitats.

For aquatic areas, the Action Area includes segments of the Brazos River and Oyster Creek that could have physical, chemical, or biotic effects from the Project. The hydrology and hydraulics analyses were used to determine the aquatic extent of the Action Area. The Action Area includes the northern limits of the Project workspace on Oyster Creek and extends downstream along Oyster Creek to the Lake Jackson pump station that would receive the Oyster Creek discharge from the Project. The Action Area also includes the Brazos River and the 5,000-linear-foot offset from the proposed intake structure to include aquatic areas in the vicinity that may be affected by turbidity or sediment from construction activities. The offset distance is based off guidance from the National Marine Fisheries Service and the Federal Highway Administration on attenuation of turbidity from construction activities in aquatic environments.

For terrestrial areas, the Action Area limits are extended beyond the Project workspace to an offset distance to evaluate any potential effects outside of the immediate Project workspace caused by the Project. The offset distance of 1,000 feet was based on the ecology of the listed species that may be affected by the Project. The 1,000-foot offset distance was applied to those portions of the Project workspaces located within the whooping crane (*Grus americana*) migration corridor in Brazoria County to evaluate the effects of the action that may have consequences on the whooping crane or its potential stopover habitats.

## **2.3 Determination of Permit Area for Section 106 of the National Historic Preservation Act**

The Corps' Procedures for the Protection of Historic Properties (Appendix C to 33 CFR 325) defines the Permit Area as those areas comprising WOUS that would be directly affected by the Project or structures and uplands directly affected as a result of authorizing the Project or structures.

### **2.3.1 *Final Description of the Permit Area***

The Permit Area includes those areas comprising WOUS that would be directly affected by the Project or structures and uplands directly affected as a result of authorizing the Project or structures. For the Project, the Permit Area is defined as the 2,533-acre Project site.

### **3 PURPOSE AND NEED**

#### **3.1 Purpose and Need for the Project as Provided by the Applicant and Reviewed by the Corps**

The Texas Commission on Environmental Quality (TCEQ) considers water supply systems with 180 days or fewer of available water supply at risk during drought. Based on modeling, Dow estimates that a total of 78,000 AF of water storage capacity is necessary to provide drought resilience for Dow's Texas Operations and Brazosport Water Authority, which receives water through the Dow water supply system. Based on a 2020 survey, the current combined storage capacity in the existing Brazoria and Harris Reservoirs is approximately 27,343 AF (Doyle & Wachtstetter, Inc. 2020). Therefore, Dow needs to develop additional storage capacity of at least 50,658 AF to provide a reliable water supply during drought. The new reservoir would increase Dow's storage capacity by approximately 51,000 AF, which, in conjunction with the existing two reservoirs, would provide 180 days of water storage when that reservoir comes online. The Corps has determined that the overall Project purpose is to use Dow's existing run-of-river water rights from the Brazos River to improve reliability during extended drought conditions for the existing water supply system that serves Dow's Texas Operations and other industrial, community, and potable water users that rely on Dow's water supply.

#### **3.2 Basic Project Purpose, as Determined by the Corps**

The basic purpose of the Project is to improve the reliability of the water supply system that serves Dow's Texas Operations in Freeport during extended drought conditions.

#### **3.3 Water Dependency Determination**

The proposed Project does not require access or proximity to, or siting within, a special aquatic site to fulfill its basic purpose. Alternatives that do not involve impacts to special aquatic sites are presumed to be available.

#### **3.4 Overall Project Purpose, as Determined by the Corps**

The overall Project purpose is to use Dow's existing run-of-river water rights from the Brazos River to improve reliability during extended drought conditions for the existing water supply system that serves Dow's Texas Operations in Freeport, as well as other industrial, community, and potable water users that rely on Dow's water supply. Based on modeling, Dow estimates that a total of 78,000 AF of water storage capacity is necessary to provide TCEQ's recommended 180 days of drought resilience (Watearth 2020).

## 4 PUBLIC OUTREACH AND COORDINATION AND COMMENTS

As part of Dow's DA permit application process, a public notice was issued on March 29, 2018, and comments were accepted until June 2, 2018. During the public notice period, comments were received from the general public; nongovernmental organizations; and local, state, and federal government agencies. Although most of the commenters requested a detailed analysis on the impacts to aquatic resources over a large geographic area, many of the commenters also noted that the Project site is located in the Columbia Bottomlands, an ecologically important region to bird species. State and federal agencies, nonprofit environmental organizations, and several public citizens requested that impacts to migratory or nesting bird species be further studied.

Scoping for the Project was conducted in accordance with the Corps March 24, 2020, memorandum titled *Interim Army Procedures for National Environmental Policy Act (NEPA)* in response to the Coronavirus Disease 2019 (COVID-19) pandemic (USACE 2020). The memorandum established interim DA NEPA procedures in consideration of the COVID-19 public health emergency. The interim NEPA procedures applied to all DA NEPA proponents responsible for NEPA compliance. The procedures included developing alternative means of public engagement, including virtual meetings.

The Corps issued a notice of intent (NOI) to inform agencies and the general public that an EIS is being prepared and invited comments on the scope and content of the document and participation at a public scoping meeting. The NOI announced the development of a public involvement program allowing opportunities for public participation and involvement in the NEPA process. The NOI also provided information on the date and time of the public scoping meeting. The NOI was published in the *Federal Register* on April 7, 2020 (*Federal Register* 85:19460). The Corps sent email notices to its EIS mailing list, and the NOI was posted on the Corps website. The public comment period ended on July 2, 2020, as stated in the NOI.

An agency scoping meeting was held via Cisco WebEx Events on May 12, 2020. Agencies that attended the meeting included the U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service, TCEQ, Texas Parks and Wildlife Department, and the Texas Historical Commission. Interagency coordination has assisted the Corps in determining the scope of this EIS; developing Project components and objectives; identifying the range of alternatives; identifying constraints; and defining potential environmental impacts, impact significance, and feasible mitigation measures.

The Corps held a public scoping meeting to solicit input from the community and public agencies regarding Project design, alternatives selection, and the scope and content of the EIS. The meeting was held via Cisco WebEx Events on June 17, 2020. All comment letters received during scoping are presented in Appendix L of the FEIS. In addition to scoping activities, other public outreach activities included a website (<https://doweisproject.com>) that provides overview information about the proposed Project. Documents are posted to the website as they become available, including the EIS scoping report and EIS agency meeting scoping report (see Appendix L of the FEIS).

The Corps solicited comments on the Project DEIS from the public, federal, state, and local agencies and officials; tribes; and other interested parties. The notice of availability for the DEIS was published by the Corps in the *Federal Register* on April 8, 2022 (*Federal Register* 87:20852). The public meetings for the Project were held virtually on May 3, 2022, from 11:00

a.m. to 2:00 p.m. central time and from 4:00 p.m. to 7:00 p.m. central time. Access information, instructions, an opportunity to subscribe to Project updates, and additional information regarding the Project were made available on the Project website (<https://doweisproject.com>) prior to the public hearings. Comments on the DEIS were received after the publication of the public notice; during the public hearings as recorded and transcribed in the meeting transcript; and during the commenting period, which ended on June 10, 2022. An estimated 140 substantive comments (102 similar/duplicative substantive comments were combined) were recorded and transcribed. Comments were received by June 10, 2022, and accepted (plus one additional comment letter, which was received on June 21, 2022).

Comments from the public, including other federal and state agencies, were considered by the Corps during the development of Project FEIS. Comments and responses are available in Appendix N of the FEIS.

The notice of availability for the FEIS was published by the Corps in the *Federal Register* on June 16, 2023 (*Federal Register* 88:39423), and was available for a 30-day public review period. The Corps received comments from five individuals and/or organizations. Most of the comments were a reiteration or resubmission of comments submitted on the DEIS, which are not addressed herein (see Appendix N of the DEIS). Additional comments or new comments received related to questions about 1) the adequacy of hydrologic and hydraulic (flood) modeling conducted for the Project to analyze potential flooding impacts, 2) the Corps' determination as it relates to mitigation sequencing, 3) co-location of mitigation, and 4) the need for mitigation for historic Columbia Bottomlands. In addition, comments related to the Corps' adherence to CWA 404(b)(1) guidelines and the selection of the least environmentally damaging practicable alternative (LEDPA) were received. Comments received on the FEIS that require additional responses are addressed in Section 10 of this ROD.

## **5 ALTERNATIVES ANALYSIS (33 CFR 325 APPENDIX B(7), 40 CFR 230.5(C), AND 40 CFR 1502.14)**

An evaluation of alternatives is required under NEPA for all jurisdictional activities. An evaluation of alternatives is required under CWA Section 404(b)(1) guidelines for projects that include the discharge of dredged or fill material into WOUS. NEPA requires discussion of a reasonable range of alternatives, including the no action alternative, and the effects of those alternatives; under the 404(b)(1) guidelines, practicability of alternatives is taken into consideration, and no alternative may be permitted if there is a LEDPA.

### **5.1 Site Selection and Screening Criteria**

To be practicable, an alternative must be available; achieve the overall Project purpose (as defined by the Corps); and be feasible when considering cost, logistics, and existing technology.

The Corps conducted a multistep process to screen the range of alternatives to determine which alternatives are reasonable, practicable, and meet the Project purpose. The Project alternatives were analyzed using the following screening criteria to identify a range of reasonable alternatives: satisfaction of the overall Project purpose, practicability based on CWA Section 404(b)(1) guidelines (i.e., technology, logistics, and cost), and consideration of potential aquatic resources impacts.

- **Screen 1. Purpose and need:** Does the alternative meet the purpose and need for the Project? Is the alternative capable of serving the water supply needs? Is the reservoir storage site large enough to meet the Project need? Is the water supply (yield) adequate to satisfy the purpose and need?
- **Screen 2. Technological feasibility:** Can the alternative be constructed? Are there engineering fatal flaws, such as foundation conditions or geologic hazards such as karst geology, earthquake hazards, landslides, or other geotechnical considerations, that cannot be mitigated? This screen uses information based on engineering analyses.
- **Screen 3. Environmental impacts:** Does the alternative resolve resource conflicts that other alternatives do not? For example, how do the remaining alternatives compare to each other when considering impacts to aquatic resources?
- **Screen 4. Project cost:** Though cost alone is insufficient justification for dismissing an alternative from detailed analysis, cost (capital and operations and maintenance costs) is an important consideration in determining the feasibility of an alternative for evaluation of a least environmentally damaging practicable alternative.
- **Screen 5. Unique considerations:** Because Dow intended to use its existing run-of-the-river water rights, alternatives that could be carried forward for further analysis needed to rely on Dow's existing water rights.

Based on this analysis, the Corps determined that a No Action alternative and four action alternatives be carried forward for detailed analysis in the EIS. See FEIS Chapter 2 for further detail on evaluation of reasonable alternatives.

## 5.2 Description of Alternatives

### 5.2.1 *No Action Alternative (no federal action)*

Under the No Action alternative, no additional water storage would be constructed and the Project would not take place. Dow would continue to operate its water supply system as is currently done. The No Action alternative would include Dow's current water conservation and water reclamation projects.

### 5.2.2 *On-site Alternatives*

#### 5.2.2.1 **ALTERNATIVE 1: PROPOSED ACTION ALTERNATIVE**

Alternative 1, hereafter referred to as the Proposed Action, would include the construction, operations, and maintenance of an off-channel reservoir adjacent to the existing Harris Reservoir. The proposed reservoir along the Brazos River would be operated in conjunction with the existing Harris Reservoir located immediately to the south and with the existing Brazoria Reservoir located 21 miles downstream. The total available storage would increase from 68 days of water to 180 days, with an estimated annual yield of approximately 80,000 acre feet (AF). During periods of drought, the proposed reservoir would be exhausted first, followed by the existing Harris Reservoir, and then the existing Brazoria Reservoir. As with current operations, emergency releases would occur during severe weather events, such as tropical storms and hurricanes with wind speeds that can overtop the embankments.

The proposed reservoir would include a 1,929-acre impoundment with a storage capacity of 51,000 AF, an intake and pump station to divert water from the Brazos River, and an outlet and emergency spillway to Oyster Creek. The Project would also include temporary construction staging and laydown areas. After reservoir construction, the Project would include floodplain enhancements and stream restoration in Oyster Creek.

#### **5.2.2.2 ALTERNATIVE 2A: ALTERNATE EMBANKMENT CONFIGURATION ALTERNATIVE**

Alternative 2A, the Alternate Embankment Configuration alternative, includes an alternate site layout located on the same site as the Proposed Action. The embankment would roughly parallel the Project site's boundary. This larger configuration would add approximately 56,760 AF of storage capacity. The reservoir embankment would have an approximate footprint of 2,195 acres within the Oyster Creek floodplain (266 acres larger than the Proposed Action). Other Project components would be the same as those described for the Proposed Action.

#### **5.2.2.3 ALTERNATIVE 2B: ALTERNATE LAYOUT ALTERNATIVE**

The footprint of the embankment under Alternative 2B, the Alternative Reservoir Layout alternative (the Project and Applicant's Preferred Alternative), would be slightly smaller than the Proposed Action embankment but located on the same site as the Proposed Action. The west side of the embankment would be set back 273 feet from the Brazos River oxbow, compared to 90 feet for the Proposed Action. This would improve safety in this area and reduce the embankment length. Storage capacity would be approximately 50,936 AF. The reservoir embankment would have a footprint of approximately 1,919 acres within the Oyster Creek floodplain (10 acres smaller than the Proposed Action). Other Project components would be the same as those described for the Proposed Action.

### **5.2.3 *Off-site Alternatives***

#### **5.2.3.1 ALTERNATIVE 3: WEST BANK ALTERNATIVE**

Alternative 3, the West Bank alternative, provides an alternative location outside the floodplain. This alternative includes construction of a 51,080-AF off-channel reservoir, which is essentially the same design as the Proposed Action reservoir, that still allows Dow to use its existing Brazos River water rights. The reservoir under Alternative 3 would not be located adjacent to Dow's existing Harris Reservoir infrastructure, therefore requiring an extensive water conveyance pipeline system and bridge crossing to move water across the Brazos River. The Alternative 3 site would be approximately 2,885 acres and allow a reservoir that could tie into the existing Harris Reservoir and discharge into Oyster Creek. The Alternative 3 site is not currently owned by Dow and is primarily agricultural land.

#### **5.2.3.2 ALTERNATIVE 4: BRACKISH WATER DESALINATION ALTERNATIVE**

Alternative 4, the Brackish Water Desalination alternative, would include building a brackish water desalination plant instead of a reservoir to provide water for Dow's Texas Operations. This alternative would include diversion of brackish surface water from the Brazos River using an intake facility, a reverse osmosis plant, an outfall to discharge brine concentrate, and water conveyance facilities. The desalination plant would produce 94 million gallons per day of

desalinated water, which would require preliminary treatment (pretreatment) and solids handling and disposal. The desalination plant would also require an access road to the plant location, a power line corridor, and pipeline conveyance routes.

The brackish water desalination plant would be located along the Brazos River near the City of Lake Jackson. The site was selected to enable diversion of Dow's existing water rights and to leverage water quality with lower salinity than a diversion located farther downstream nearer to the Gulf of Mexico. The 733-acre site, which is just south of Dow's Brazoria Reservoir, is not currently owned by Dow and is primarily undeveloped land.

## **5.3 Alternatives Evaluation**

### **5.3.1 Reasonableness of Alternatives Under the National Environmental Policy Act**

A comprehensive analysis of reasonable alternatives is provided in Chapter 2 of the FEIS. A wide range of alternatives were considered and dismissed from detailed consideration because they were not available to the Applicant or did not meet the Project purpose and need. In the FEIS, the No Action alternative and five action alternatives (the Proposed Action, Alternative 2A, Alternative 2B, Alternative 3, and Alternative 4) were considered.

### **5.3.2 Practicable Alternatives Under Section 404(b)(1) Guidelines**

An alternative is practicable only if it is 1) available and 2) capable of being done after taking into account cost, existing technology, and logistics in light of overall project purposes (see 40 CFR 230.10(a)(1)). A multistep process to screen the range of alternatives to determine which alternatives are reasonable, practicable, and meet the Project purpose was conducted and coordinated for concurrence with the cooperating agencies in July 2020. The alternatives were analyzed using the following screening criteria to identify a range of alternatives: satisfaction of the overall Project purpose, practicability based on CWA Section 404(b)(1) guidelines (i.e., technology, logistics, and cost), and consideration of potential aquatic resources impacts.

## **5.4 Least Environmentally Damaging Practicable Alternative and Environmentally Preferable Alternative**

The environmental consequences of the five practicable alternatives (the Proposed Action, Alternative 2A, Alternative 2B, Alternative 3, and Alternative 4) and the No Action alternative (as a required baseline analysis) are presented in Chapter 3 of the DEIS and FEIS. Table ES-1 and Table 2.9-1 in the FEIS provide a detailed comparison of environmental consequences of each alternative.

The Proposed Action (Alternative 1) is Dow's proposed alternative submitted in the permit application. However, Dow continued developing on-site alternatives that were also considered practicable and were carried forward in the analysis as Alternatives 2A and 2B. The effects to water resources such as wetlands and WOUS were similar for all three of these alternatives with a few exceptions. No other significant adverse environmental impacts were identified for these alternatives.

In addition to these on-site alternatives, two off-site alternatives were included in the analysis as a result of comments received during the initial public notice and the scoping process. Alternative 3 is a practicable alternative location that is not in the floodplain, and Alternative 4 is the Brackish Water Desalination alternative.

Alternative 3 has the largest possible wetland impacts, including to the Columbia Bottomlands forest, and would require a bridge across the Brazos River to be practicable. The Bridge would have a minor impact to navigation and minor to moderate long-term impacts to the Brazos River and its floodplain resulting from increases in scour, incision, and widening of the channel.

Alternative 4 has the second-largest wetland impacts, including to the Columbia Bottomlands forest. Brine is an unavoidable product of desalination that can impact aquatic biota when discharged into brackish water such as this segment of the Brazos River. Operations of a desalination plant are regulated by the State of Texas. Impacts by brine release from Alternative 4 were determined to be negligible to minor with implementation of the State of Texas's industrial waste permits; spill prevention, control, and countermeasures; stormwater pollution prevention; and BMPs. No other significant adverse environmental impacts were identified for this alternative.

The analysis of both on-site and off-site alternatives identifies Alternative 2B as the practicable alternative with the least adverse effect on the aquatic ecosystem.

## **6 EVALUATION FOR COMPLIANCE WITH SECTION 404(B)(1) GUIDELINES**

The following evaluation is consistent with 40 CFR 230.5.

### **6.1 Practicable Alternatives**

Practicable alternatives to the proposed discharge consistent with 40 CFR 230.5(c) are evaluated in Section 5. The statements below summarize the analysis of alternatives:

In summary, the No Action alternative, which would not involve discharge into waters, is not practicable.

The Applicant has demonstrated that there are no practicable alternatives that do not involve special aquatic sites.

The proposed discharge in Alternative 2B is the practicable alternative with the least adverse impact on the aquatic ecosystem, and it does not have other significant environmental consequences. It has been determined that there are no alternatives to the proposed discharge that would be less environmentally damaging (Subpart B in 40 CFR 230.10(a)).

### **6.2 Disposal Site**

Each disposal site must be specified through the application of candidate disposal site delineation guidelines (Subpart B in 40 CFR 230.11(f)). The following factors were considered: depth of water at the disposal site and current velocity, direction, and variability at the disposal site. The Project disposal will be on-site to create the reservoir embankment.

## 6.3 Potential Impacts on Aquatic Ecosystem

This section discusses the potential impacts from the Project on physical and chemical characteristics of the aquatic ecosystem listed in Table 1 (Subpart C in 40 CFR 230.20). Information regarding the referenced chemical and physical characteristics can be found in FEIS Sections 3.3, 4.3, and 5.3.4.

**Table 1. Potential Impacts on Physical and Chemical Characteristics**

Aquatic Ecosystem	Effect Determination	Cumulative Effects
Physical and chemical characteristics	Not applicable	The Project will not have a substantive contribution to cumulative effects to physical and chemical characteristics of the aquatic ecosystem.
Substrate	Long-term moderate effects to reservoir from substrate changes; Oyster Creek wetting and drying cycle changes resulting in increased downstream erosion, channel incision, and widening of receiving waters	
Suspended particulates and turbidity	Long-term moderate impacts to Oyster Creek from reservoir releases creating wet/dry conditions and potential erosion	
Water	Long-term moderate effects from reservoir releases creating wet/dry conditions that will cause water temperature and dissolved oxygen values to fluctuate within Oyster Creek watershed below the reservoir	
Current patterns and water circulation	Long-term moderate effects to Oyster Creek from reservoir releases creating wet/dry conditions and potential erosion	
Normal water fluctuations	Long-term moderate effects within reservoir footprint as the area would become continuously inundated; long-term moderate impacts to Oyster Creek from reservoir releases creating wet/dry conditions and potential erosion	
Salinity gradients	Not applicable	

The fill material to be placed for the Project is associated with the construction of the reservoir embankment and other reservoir appurtenances. The wetlands and WOUS within the footprint of the proposed reservoir will be permanently lost during filling, excavation, and inundation resulting from construction. This fill material is not being discharged into open water and will have negligible to minor short-term effect on the physical and chemical characteristics of the non-living environment. Long-term moderate effects on Oyster Creek are expected to occur during operations of the reservoir.

## 6.4 Potential Impacts on the Living Communities or Human Uses

### 6.4.1 *Biological Characteristics of the Aquatic Ecosystem*

More information regarding potential impacts on the biological characteristics of the aquatic ecosystem (Subpart D in 40 CFR 230.30) summarized in Table 2 can be found in FEIS Sections 4.5, 4.6, 4.7, 5.3.4.9, and 5.3.4.10.

The Project may affect, but is not likely to adversely affect, the whooping crane, as stated in the final biological assessment and FEIS Section 4.6. Long-term moderate effects on Oyster Creek are expected to occur during operations of the reservoir.

**Table 2. Potential Impacts on Biological Characteristics**

Biological Characteristics	Effects Determination	Cumulative Effects
Threatened and endangered species	Whooping crane: May affect, not likely to adversely affect Texas fawnsfoot: no effect	The Project will not contribute to cumulative effects to threatened and endangered species but could contribute to cumulative effects to terrestrial and aquatic species resulting from Oyster Creek changes downstream of the reservoir outfall
Fish, crustaceans, mollusks, and other aquatic organisms	Long-term moderate effect from potential increased flow velocity and erosion during reservoir drought releases; low potential for temperature changes in receiving waters and from loss, degradation, and fragmentation of wetland and riparian habitats	
Other wildlife	Moderate effects from habitat fragmentation, tree removal, and permanent conversion of cultivated crops, pasture/hay, and grassland; and loss of wetland habitats and conversion to open water, maintained grass, and impervious surface	

### 6.4.2 Special Aquatic Sites

Potential impacts on special aquatic sites (Subpart E in 40 CFR 230.40) are listed in Table 3.

**Table 3. Potential Impacts on Special Aquatic Sites**

Special Aquatic Sites	Effects Determination	Cumulative Effects
Sanctuaries and refuges	Not applicable (N/A)	The Project will contribute to ongoing development within the watershed. Impacts would be reduced through BMPs and/or required mitigation measures for unavoidable impacts.
Wetlands	Long-term moderate effects; loss of 15.78 acres of delineated wetlands	
Mud flats	N/A	
Vegetated shallows	N/A	
Coral reefs	N/A	
Riffle and pool complexes	N/A	

Information regarding the special aquatic sites listed in Table 3 can be found in FEIS Sections 3.3.4, 4.3.4, and 5.4.3.6. The Project will result in the permanent loss of 15.78 acres of wetlands. All wetlands within the boundaries of the proposed reservoir and associated intake station and spillway would be considered a permanent loss and will be filled. The largest impact will be to Jennings Bayou, which is an intermittent distributary of Oyster Creek. Construction of the reservoir will disconnect and permanently flood Jennings Bayou. The surrounding area in the reservoir footprint will be converted from a fluvial to a lacustrine aquatic resource. The other special aquatic sites are not known to exist within the Project site.

### 6.4.3 Human Use Characteristics

Potential impacts on human use characteristics (Subpart F in 40 CFR 230.50) are listed in Table 4.

**Table 4. Potential Impacts on Human Use Characteristics**

Human Use Characteristics	Effects Determination	Cumulative Effects
Municipal and private water supplies	No effect	The Project will not contribute to cumulative effects.
Recreational and commercial fisheries	No effect	
Water-related recreation	No effect	
Aesthetics	No effect	
Parks, national and historical monuments, national seashores, wilderness areas, research sites, and similar preserves	Not applicable	

## 6.5 Pre-testing Evaluation

The characteristics in Table 5 have been considered in evaluating the biological availability of possible contaminants in dredged or fill material (Subpart G in 40 CFR 230.60).

**Table 5. Contaminant Evaluations for Dredged or Fill Material**

Contaminant Evaluations	Evaluated
Physical characteristics	X
Hydrography in relation to known or anticipated sources of contaminants	X
Results from previous testing of the material or similar material near the Project	X
Known, significant sources of persistent pesticides from land runoff or percolation	X
Spill records for petroleum products or designated hazardous substances (Section 331 of CWA)	X
Other public records or significant introduction of contaminants from industries, municipalities, or other sources	X
Known existence of substantial material deposits of substances that could be released in harmful quantities to the aquatic environment by human-induced discharge activities	X

The Corps has found no evidence of any past or potential sources of contaminants that could affect the proposed fill material or the aquatic environment.

It has been determined that testing is not required because the discharge and extraction sites are adjacent, and the Corps has no credible information that potential sources of contaminants exist within the proposed reservoir site.

## 6.6 Evaluation and Testing

The proposed fill material will come from on-site lands, and there is no reason to believe it is a carrier of contaminants (Subpart G in 40 CFR 230.61).

## 6.7 Actions to Minimize Adverse Impacts

The actions in Table 6 have been taken (Subpart H in 40 CFR 230.70-230.77) to ensure minimal adverse effects of the proposed discharge.

**Table 6. Actions to Ensure Adverse Effects are Minimized**

Action	Action Taken
Actions concerning the location of the discharge	X
Actions concerning the material to be discharged	X
Actions controlling the material after discharge	X
Actions affecting the method of dispersion	X
Actions affecting plant and animal populations	X
Actions affecting human use	X

There is detailed discussion regarding the minimization of adverse effects in Section 2.8 and Chapter 4 of the FEIS. The location of the Project has been evaluated and minimized to the furthest practicable extent through review and analysis of practicable alternatives.

## 6.8 Factual Determinations

The determinations (Subpart B in 40 CFR 230.11) in Table 7 are made based on the applicable information in the FEIS, including actions to minimize effects and consideration for contaminants.

**Table 7. Factual Determinations of Potential Impacts**

Site	Determination
Physical substrate	No effect
Water circulation, fluctuation, and salinity	Negligible or not applicable
Suspended particulates/turbidity	No effect
Contaminants	No effect
Aquatic ecosystem and organisms	Long-term moderate effect from permanent conversion of wetlands and WOUS
Proposed disposal site	N/A
Cumulative effects on the aquatic ecosystem	Contribution to cumulative effects to aquatic wildlife and vegetation due to the effects to Oyster Creek from operations of the reservoir
Secondary effects on the aquatic ecosystem	Long-term moderate effects to Oyster Creek from operations of the reservoir

Water circulation and fluctuation will still occur within the watershed; however, the ecosystem will be altered from wetlands and WOUS to an open water reservoir. The aquatic ecosystem and organisms will be affected by potential increased flow velocity and erosion during reservoir drought releases. There will be a low potential for temperature changes in receiving waters. Flow changes downstream of the reservoir outfall into Oyster Creek could result in erosion and/or channel widening. Effects to Oyster Creek could occur from reservoir releases that create wet/dry conditions.

## 6.9 Restrictions on Discharges

Based on the information in Section 6, including the factual determinations (see Section 6.8), the proposed discharge has been evaluated to determine whether any of the restrictions on discharge would occur (40 CFR 230.10(a–d) and 230.12).

The applicable subjects in Table 8 have been identified and addressed through the EIS process; development of adaptive management plans; the TCEQ water quality certification; and continuous coordination among local, state, and federal agencies.

**Table 8. Compliance with Restrictions on Discharge**

Subject	Yes	No
1. Is there a practicable alternative to the proposed discharge that would be less damaging to the environment (any alternative with less aquatic resource effects, or an alternative with more aquatic resource effects that avoids other significant adverse environmental consequences?)		X
2. Will the discharge cause or contribute to violations of any applicable water quality standards?		X
3. Will the discharge violate any toxic effluent standards (under Section 307 of the CWA)?		X
4. Will the discharge jeopardize the continued existence of endangered or threatened species or their critical habitat?		X
5. Will the discharge violate standards set by the U.S. Department of Commerce to protect marine sanctuaries?		X
6. Will the discharge cause or contribute to significant degradation of WOUS?		X
7. Have all appropriate and practicable steps (Subpart H in 40 CFR 230.70) been taken to minimize the potential adverse impacts of the discharge on the aquatic ecosystem?	X	

## 7 GENERAL PUBLIC INTEREST REVIEW

The decision whether to issue a permit will be based on an evaluation of the probable impacts, including cumulative impacts, of the proposed activity and its intended use on the public interest as stated at 33 CFR 320.4(a). To the extent appropriate, the public interest review below also includes consideration of additional policies as described in 33 CFR 320.4(b) through (r). The benefits that may be reasonably expected to accrue from the proposal are balanced against its reasonably foreseeable detriments.

### 7.1 Public Interest Factors

All public interest factors have been reviewed, and those that are relevant to the Project are considered and discussed in additional detail. See Table 9 and any discussion that follows.

**Table 9. Public Interest Factors**

Interest Factor	Effects	FEIS Section
1. Conservation	No effect	4.3, 4.4, 4.6, 4.6, 4.7, 4.8, and 4.10.5
2. Economics	Negligible to minor effects	4.10.1, 4.10.3, and 4.10.4
3. Aesthetics	Negligible to minor effects	4.10.6
4. General environmental concerns	Negligible to moderate effects	Chapter 4
5. Wetlands (see below for discussion)	Moderate effects	4.3.4
6. Historic properties	No effect	4.13
7. Fish and wildlife values (see below for discussion)	Moderate effects	4.5, 4.6, 4.7, and 4.8
8. Flood hazards (see below for discussion)	Negligible to moderate effects	4.3.2
9. Floodplain values	Negligible to moderate effects	4.3.2
10. Land use	Moderate effect	4.9
11. Navigation	No effect	4.10.5
12. Shoreline erosion and accretion (see below for discussion)	Moderate effects	4.2.3 and 4.3.1
13. Recreation	No effects	4.10.5
14. Water supply and conservation (see below for discussion)	Beneficial effect	4.3.3 and 4.10.2
15. Water quality	Moderate effect	4.3.1
16. Energy needs	No effect	4.15.3
17. Safety	Minor effects	4.15.1
18. Food and fiber production	No effect	4.2.2.5
19. Mineral needs	No effect	Not applicable
20. Consideration of property ownership	No effect	3.9.1 and 4.9.1
21. Needs and welfare of the people	No effect	4.10.1, 4.10.2, 4.10.3, and 4.10.4

**Wetlands:** The Project will result in the permanent loss of 15.78 acres of wetlands. The Corps has approved the compensatory mitigation plan attached to this document as mitigation for the loss of wetlands attributed to the reservoir construction.

**Fish and wildlife values:** Conversion of the wetlands and WOUS to open water habitat will alter the type of wildlife and use of the Project site by fish and wildlife.

**Flood hazards:** There would be a moderate impact from loss of floodplain storage, countered by operational mitigation measures; impacts from potential to block interbasin flows would be negligible.

**Shoreline erosion and accretion:** Potential erosion and channel widening downstream of the reservoir outfall into Oyster Creek may occur due to wet/dry conditions during drought releases. The compensatory mitigation plan attached to this document addresses mitigation and adaptive management related to this potential effect.

**Water supply and conservation:** Water supply will become more reliable and readily available during drought through collection and storage of increased flows earlier in the season.

### **7.1.1 Climate Change**

The proposed activities within the Corps' federal control and responsibility likely will result in a negligible release of greenhouse gases into the atmosphere when compared to global greenhouse gas emissions. Greenhouse gas emissions have been shown to contribute to climate change. Aquatic resources can be sources and/or sinks of greenhouse gases. For instance, some aquatic resources sequester carbon dioxide, whereas others release methane; therefore, authorized impacts to aquatic resources can result in either an increase or decrease in atmospheric greenhouse gas. These impacts are considered de minimis. Greenhouse gas emissions associated with the Corps' federal action may also occur from the combustion of fossil fuels associated with the operation of construction equipment, increases in traffic, etc. The Corps has no authority to regulate emissions that result from the combustion of fossil fuels. These are subject to federal regulations under the Clean Air Act. Greenhouse gas emissions from the Corps' action have been weighed against national goals of energy independence, national security, and economic development and have been determined not contrary to the public interest.

## **7.2 Public and Private Need for the Project**

There is no direct public need for the Project. The private need is to provide drought resilience for Dow's Texas Operations and the Brazosport Water Authority, which receives water through the Dow water supply system.

## **7.3 Unresolved Resource Use Conflicts**

There were no unresolved conflicts identified regarding resource use.

## **7.4 Beneficial and Detrimental Effects on Public and Private Use**

Detrimental effects on the public and private use of the Project site are expected to be minimal and temporary. Beneficial effects on the public and private use of the Project site are expected to be minimal and permanent. The Corps has determined that with mitigation, the long-term beneficial effects of the Project will outweigh the detrimental effects of the Project.

## 8 MITIGATION

This section describes Project mitigation (33 CFR 320.4(r), 33 CFR 332, 40 CFR 230.70-77, 40 CFR 1508.20, and 40 CFR 1502.14).

### 8.1 Avoidance and Minimization

When evaluating a proposal including regulated activities in WOUS, consideration must be given to avoiding and minimizing effects to those waters. Avoidance and minimization measures are described in Section 1.3.1 of this ROD and within the FEIS.

**Were any other mitigative actions, including Project modifications, discussed with the Applicant implemented to minimize adverse Project impacts?**

Yes. An adaptive operations plan was adopted to address potential effects to Oyster Creek downstream of the reservoir outlet.

**Is compensatory mitigation required to offset environmental losses resulting from proposed unavoidable impacts to WOUS?**

Yes. The Project will impact wetlands and waterbodies within the footprint of the reservoir and facilities. Because of these impacts, a significant amount of compensatory mitigation is being offered by the Applicant to offset these impacts, as detailed in the compensatory mitigation plan attached to this document.

### 8.2 Type and Location of Compensatory Mitigation

**Is the impact in the service area of an approved mitigation bank?**

Yes. A compensatory mitigation bank is available for wetlands; however, no mitigation bank for streams is available.

**If yes, does the mitigation bank have appropriate number and resource type of credits available?**

The mitigation bank is limited to wetland credits but does not offer stream credits.

**Is the impact in the service area of an approved in-lieu fee program?**

No.

**If yes, does the in-lieu fee program have the appropriate number and resource type of credits available?**

Not applicable

### 8.2.1 Selected Compensatory Mitigation Type/Location(s)

Compensatory mitigation will include on-site and off-site permittee-responsible mitigation (Table 10).

Table 10. Mitigation Type and Location

Mitigation Type	Mitigation Selected
Mitigation bank credits	
In-lieu fee program credits	
Permittee-responsible mitigation under a watershed approach	
Permittee-responsible mitigation, on-site and in-kind	X
Permittee-responsible mitigation, off-site and/or out of kind	X

Does the selected compensatory mitigation option deviate from the order of the options presented in 33 CFR 332.3(b)(2)–(6)?

Yes.

If yes, provide rationale for the deviation, including the likelihood for ecological success and sustainability, location of the compensation site relative to the impact site and their significance within the watershed, and/or the costs of the compensatory mitigation project (see 33 CFR 332.3(a)(1)).

To compensate for unavoidable impacts to streams in the absence of a mitigation bank, Dow is required to complete a large permittee-responsible stream mitigation project. Dow has used the available linear feet of Oyster Creek but required additional linear feet off-site to fully compensate for impacts. Additional stream mitigation was identified at the non-tidal segments of Big Slough, a stream located within the same watershed and ecoregion as the impact site. The watershed/ecoregion approach is similar to the service area approach in mitigation banks. By including the wetland mitigation in the permittee responsible compensatory mitigation plan, the functions and values of the wetlands, riparian areas, and floodplains are more physically, chemically, and biologically integrated and will provide many of the same functional benefits as the impacted streams such as Jacobs Creek.

### 8.3 Amount of Compensatory Mitigation

**Wetland compensatory mitigation:** Wetlands that are within the footprint of the proposed reservoir and associated facilities will be considered to be completely impacted. Therefore, these wetlands will require permittee-responsible mitigation for their full value. Wetlands in the temporary workspace will require clearing of trees but will otherwise be kept intact because these areas will be restored to preconstruction contours. This will result in the conversion of forested wetlands to non-forested wetland habitats. Considering the potentially long-term construction timeline of the Project, converted forested wetlands will be treated as a permanent impact. Wetlands within the restoration area will augment stream functional values and, therefore, will count as neither wetland impact nor impact minimization.

Permanent impacts to non-forested wetlands within the Project site will require 7.024, 7.749, and 6.849 credits of non-forested TSSW, MPAC, and RSEC, respectively. Likewise, temporary and permanent impacts to forested wetlands within the Project site will require 4.776, 4.893, and 4.883 credits of forested TSSW, MPAC, and RSEC, respectively.

**Stream compensatory mitigation:** Streams within the reservoir embankment and the pump station footprint will require mitigation for 43,856 linear feet of impacts. Stream mitigation requirements will be provided at both the Oyster Creek and the Big Slough mitigation sites.

**Rationale for required compensatory mitigation amount:** The required mitigation amounts have been established to offset environmental losses resulting from unavoidable impacts to WOUS by the Project. See the attached compensatory mitigation plan.

## 8.4 Mitigation Plan Requirements

For permittee-responsible mitigation identified in Section 8.3 above, the final mitigation plan must include the items described in 33 CFR 332.4(c)(2) through (c)(14) at a level of detail commensurate with the scale and scope of the impacts. As an alternative, the district engineer may determine that it would be more appropriate to address any of the items described in (c)(2) through (c)(14) as permit conditions, instead of components of a compensatory mitigation plan. The presence of sufficient information related to each of these requirements in the Applicant's mitigation plan is indicated by "Yes" in Table 11. "No" indicates absence or insufficient information in the plan, in which case, additional rationale must be provided below on how these requirements will be addressed through special conditions or why a special condition is not required.

The compensatory mitigation plan is attached to this document (see FEIS Appendix G).

**Table 11. Permittee-Responsible Mitigation Plan Requirements**

Requirement	Yes	No
Objectives	X	
Site selection	X	
Site protection instrument	X	
Baseline information	X	
Determination of credits	X	
Mitigation work plan	X	
Maintenance plan	X	
Performance standards	X	
Monitoring requirements	X	
Long-term management plan	X	
Adaptive management plan	X	
Financial assurances	X	

## **9 CUMULATIVE IMPACTS**

Cumulative impacts (or effects) (40 CFR 230.11(g), 40 CFR 1508.7, Regulatory Guidance Letter 84-9) are the impacts on the environment that result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor direct and indirect but collectively significant actions taking place over a period of time. A cumulative effects assessment should consider how the direct and indirect environmental effects caused by the proposed activity requiring DA authorization (i.e., the incremental impact of the action) contribute to cumulative effects, and whether that incremental contribution is significant.

### **9.1 Direct and Indirect Effects**

Construction-related impacts that would contribute to cumulative impacts include vegetation clearing, grading, and/or excavating activities and would be relatively short term and considered minor with the implementation of BMPs. The project would contribute to the cumulative effects to flooding and flood hazards but the Project improvements should successfully mitigate impacts to flood flows. Operations could cause erosion and sedimentation impacts to both Oyster Creek and the Brazos River due to reservoir releases. Refer to Chapter 5 of the FEIS.

### **9.2 Cumulative Effects Analysis Area**

The cumulative effects analysis area varies by resource evaluated. For aquatic resources, the cumulative effects analysis area is the lower portion (below the confluence of Allens Creek and the Brazos River) of the Lower Brazos River Basin (HUC 12070104) and the Austin-Oyster Creek River Basin (HUC 12040205).

### **9.3 Mitigation to Avoid, Minimize, or Compensate for Cumulative Effects**

Based on the cumulative effects analysis, several resources have the potential for cumulative impacts; however, with appropriate mitigation measures, many impacts may be reduced, including potential impacts to water quality and wetlands and potential impacts to terrestrial and aquatic wildlife and vegetation. Impacts of ongoing development may be reduced through the implementation of existing environmental programs and regulations that are aimed to protect key resources such as prime farmland, water quality, WOUS, floodplains, natural communities, protected species, and migratory birds.

### **9.4 Cumulative Impacts Conclusions**

When considering the overall impacts that will result from the proposed activity, in relation to the overall impacts from past, present, and reasonably foreseeable future activities, the incremental contribution of the proposed activity to cumulative impacts in the Permit Area is not considered significant. Compensatory mitigation will be required to help offset the impacts to eliminate or minimize the proposed activity's incremental contribution to cumulative effects within the geographic area described.

## 10 COMMENTS ON THE FINAL ENVIRONMENTAL IMPACT STATEMENT

As discussed in Section 4 of this ROD, most of the comments on the FEIS were resubmissions of the comments on the DEIS by the same entities. Additional comments or new comments received related to questions about the adequacy of hydrologic and hydraulic (flood) modeling conducted for the Project to analyze potential flooding impacts, the Corps determination as it relates to mitigation sequencing, co-location of mitigation, and the need for mitigation for historic Columbia Bottomlands. In addition, comments related to the Corps' adherence to CWA 404(b)(1) guidelines and the selection of the LEDPA were received.

### Response to comments related to flood modeling conducted for the Project:

In addition to the response below, Section 4.3.2 of the FEIS includes a detailed analysis and summary of hydrologic and hydraulic modeling and analyses conducted for the Project, including updates to that section made in response to DEIS comments (see Appendix N of the DEIS).

Hydrological models are an effective tool for representing hydrological processes to inform management of water resources. Normally, conceptual models are developed for specific conditions of a basin. Using these models under conditions different from those for which they were created can be misleading. The purpose of the Lower Brazos Flood Protection Planning Study published in March 2019 is to accurately determine the overall existing flood hazards and determine the feasibility of flood reduction hazards (Half Associates, Inc. 2019). The study was successful at determining that the water surface elevation is lower at the Project site than previously thought, but it also identified several necessary improvements to the modeling such as post-Harvey topographic updates, contemporary National Oceanic and Atmospheric Administration Atlas 14 rainfall data, limited stream gauging affecting rating curves, and incorporation of inflows/outflow and operating of the Corps' reservoirs in the basin.

To evaluate the significance of the direct, indirect (i.e., the causal secondary effects), and cumulative effects on the Brazos River and Oyster Creek from the Project and/or its alternatives, the development of a hydrologic analysis to evaluate conditions without and then with the Project and the ability to predict future hydrologic conditions was required. The Corps conducted the analysis with five fundamental goals: 1) verify that the proposed Project meets the stated purpose and need, 2) evaluate the impacts of the construction and operations of the proposed Project on the Brazos River, 3) evaluate the impact of construction of the proposed Project on floodplain loss in Oyster Creek, 4) evaluate the impact of construction of the proposed Project to interbasin flood flows from the Brazos River to Oyster Creek, and 5) evaluate impacts from operational discharges in Oyster Creek.

The results provided in the reports included in the DEIS analysis were sufficient to establish that the proposed Project meets the stated purpose for the proposed Project, to inform the environmental consequences section of the DEIS, and to develop a suitable scientific and analytical bases for comparing the effects of the Proposed Action when compared to the No Action and practicable alternatives.

The models included in the DEIS identified three interbasin flow paths from the Brazos River to Oyster Creek that will be obstructed by the Project. The removal of these flow paths would result in a shift of the interbasin flows and would increase the timing and magnitude of peak flows downstream of the existing Harris Reservoir. The increase in peak flows demonstrates the

potential for changes in water surface elevations on the downstream reaches that are outside of the area modeled in the Jacobs model submitted by Dow (Jacobs 2022a, 2022b, 2022c). The Corps addressed these additional concerns in Appendix I and J of the FEIS.

The Corps' evaluation of floodplain impacts, in accordance with 33 CFR 320.4(l) (Floodplain Management) and Executive Order 11988 (Floodplain Management), is conducted primarily through the alternatives analysis. The implementation of the executive order, as stated in 320.4(l)(3), requires that:

*the district engineer should avoid authorizing floodplain developments whenever practicable alternatives exist outside the floodplain. If there are no such practicable alternatives, the district engineer shall consider, as a means of mitigation, alternatives within the floodplain which will lessen any significant adverse impact to the floodplain.*

The analysis in the FEIS includes an evaluation of practicable alternatives to the proposed Project that exist outside of the floodplain (Alternative 3), exist within the floodplain at an alternate location (Alternative 4), and exist on-site (Alternatives 2A and 2B). The FEIS also considers plans for proposed mitigation designed to lessen any significant adverse impact of the proposed Project, including the floodplain mitigation in Oyster Creek.

The Corps has conducted a thorough evaluation of the Project and the practicable alternatives' adverse impacts on the floodplain, as required in our public interest review. By conducting these studies on the Project and evaluating multiple practicable alternatives, the Corps has complied with the Executive Order 11988. The Corps will rely on the Brazoria County Floodplain Administrator to determine compliance with the provisions of the National Flood Insurance Program (NFIP) and the Brazoria County Development Regulations.

#### Comments on the co-location of Dow's floodplain mitigation with wetland and stream compensatory mitigation:

The Applicant's proposed floodplain enhancements meet the definition of mitigation under NEPA (40 CFR 1508.1). However, this fact does not conflict with the stream mitigation required under the 404(b)(1) guidelines or the compensatory mitigation rule at 33 CFR 332 (Rule).

The relevant section of the Rule at 33 CFR 332.3(j) states that "Compensatory mitigation projects for DA permits may also be used to satisfy the environmental requirements of other programs, such as tribal, state, or local wetlands regulatory programs, other federal programs" and that "Compensatory mitigation projects may also be used to provide compensatory mitigation under the Endangered Species Act or for Habitat Conservation Plans." Therefore, the Rule expressly allows co-location of compensatory mitigation when appropriate. However, the Rule prohibits "double dipping" because the same credits may not be used to provide mitigation for more than one permitted activity.

The proposed floodplain enhancements are not required by the Corps, and no stream mitigation credit is assigned to them by the Corps. The Corps is assessing them as impacts of the Project. However, the proposed floodplain enhancements are generally considered fundamental to successful instream restoration. "Streams carry the water supplied by their watershed. The resulting hydrology and hydraulic processes provide the basic foundation for all other functions that streams provide" (Harman et al. 2012). Therefore, this relationship between a stream's hydrology and hydraulic function, including floodplain connectivity, will ultimately determine a stream's functional capability to transport water and sediment and provide habitat for aquatic organisms. These are important objectives of the compensatory mitigation plan.

As currently proposed, Oyster Creek Projects 1 and 2 holistically address mitigation requirements under multiple programs/authorities by co-locating floodplain mitigation with the stream mitigation required by the Corps, but these projects are not providing compensatory mitigation for more than one permitted activity.

Comment on Columbia Bottomlands:

During delineations of aquatic sites, vegetation was identified and documented in both the uplands and wetlands. Overall, the Project site is dominated by herbaceous upland and tilled cropland with approximately 1.2% (32 acres) of the Project site consisting of forest and shrublands forming riparian buffers (SWCA 2019).

The forested wetlands in the Project site are dominated by pecan, sugarberry, green ash, and American elm. The forested uplands are dominated with pecan, sugarberry, American elm, and Virginia live oak. The primarily softwood tree species found within these communities are typical of forested areas in the entire coastal plains and are not unique to the Columbia Bottomland hardwood forests. The Corps has established the baseline vegetation communities based on contemporary site conditions and has concluded that the Project site does not currently include Columbia Bottomland hardwoods.

The Project will impact 32 acres of forested wetlands that the Applicant will mitigate for by reconnecting Oyster Creek to the floodplain and planting 16,489 linear feet (37.8 acres) of the riparian buffers with desirable native plant species, including hardwoods, that when mature will meet the description of Columbia Bottomland hardwoods.

Comments related to LEDPA, mitigation sequencing, and 404(b)(1) requirements:

The Corps has followed requirements under the 404(b)(1) guidelines, including LEDPA selection. Refer to Sections 5.3.2, 5.4, and 6 of this ROD as well as Sections 1.2.2 and 1.4.2.1 of the FEIS and Response to Comments 77, 78, 79, 80, 81, 82, 83, and 84 in Appendix N of the FEIS.

## **11 COMPLIANCE WITH OTHER LAWS, POLICIES, AND REQUIREMENTS**

### **11.1 Section 7(a)(2) of the Endangered Species Act and Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act), Essential Fish Habitat (EFH)**

Refer to Section 2.2 of this ROD for a description of the Corps' Action Area for Section 7 consultation.

**Has another federal agency been identified as the lead agency for complying with Section 7 of the Endangered Species Act (ESA) with the Corps designated as a cooperating agency and has that consultation been completed?**

No, the Corps has completed Section 7 ESA consultation with the U.S. Fish and Wildlife Service.

**Are there listed species or designated critical habitat present or in the vicinity of the Corps' Action Area?**

The biological assessment (see Appendix O in the FEIS) concludes that the proposed Project may affect, but is not likely to adversely affect, the whooping crane and would have no effect on the Texas fawnsfoot (*Truncilla macrodon*). There is no designated critical habitat within the Action Area. Dow will implement species-specific conservation measures and general construction conservation measures to avoid and minimize effects to federally listed, proposed, and candidate species.

**Has consultation with either the National Marine Fisheries Service and/or the U.S. Fish and Wildlife Service been initiated and completed as required, for any determinations other than "no effect?"**

Yes. The U.S. Fish and Wildlife Service biological opinion was received on October 13, 2022 (see Appendix O in the FEIS).

**Is there Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act), essential fish habitat present or in the vicinity of the Corps' Action Area?**

There is no essential fish habitat in this project area.

## **11.2 Section 106 of the National Historic Preservation Act**

See Section 2.3 of this ROD for Permit Area determination.

**Has another federal agency been identified as the lead federal agency for complying with Section 106 of the National Historic Preservation Act (Section 106) with the Corps designated as a cooperating agency and has that consultation been completed?**

No, the Corps was the lead Federal Agency and Section 106 consultation has been completed.

**Are known historic properties present?**

Yes: The Corps, in consultation with the Texas State Historic Preservation Officer (SHPO) has determined that sites 41BO271, 41BO272, 41BO285, and 41BO286 are present within the permit area

**Effect determination and basis for that determination:**

The Corps, in consultation with the SHPO, has determined that the undertaking will have an adverse effect on site 41BO271 which has been determined eligible for inclusion on the National Register of Historic Places. The Corps, in consultation with the SHPO, has determined the project will have no effect on sites 41BO272, 41BO285, and 41BO286. (See Section 4.13 of the FEIS.)

**Was consultation initiated and completed with the appropriate agencies, tribes, and/or other parties for any determinations other than "no potential to cause effects"?**

Yes, the Corps has conducted consultation with the SHPO. Based on a review of the information in this section, the Corps has determined that it has fulfilled its responsibilities under Section 106 of the National Historic Preservation Act.

### **11.3 Tribal Trust Responsibilities**

**Was government-to-government consultation conducted with federally recognized Tribe(s)?**

No. The Proposed Action was coordinated with the Tribes, as appropriate. No response was received from any federally recognized Native American Tribes and/or affiliated groups. The Corps has determined that it has fulfilled its tribal trust responsibilities.

**Other tribal consultation including any discussion of tribal treaty rights?**

Not applicable

### **11.4 Section 401 of the Clean Water Act – Water Quality Certification**

**Is a Section 401 water quality certification required, and if so, has the certification been issued, waived, or presumed?**

An individual water quality certification is required and was issued by the Texas Commission of Environmental Quality on 19 September 2023.

### **11.5 Coastal Zone Management Act**

**Is a Coastal Zone Management Act consistency concurrence required, and if so, has the concurrence been issued, waived or presumed?**

A Coastal Zone Management Act consistency concurrence is not required.

### **11.6 Wild and Scenic Rivers Act**

**Is the Project located in a component of the national wild and scenic river system or in a river officially designated by Congress as a “study river” for possible inclusion in the system?**

No.

### **11.7 Effects on Corps Civil Works Projects**

**Does the Applicant also require permission under Section 14 of the Rivers and Harbors Act (33 USC 408) because the activity, in whole or in part, would alter, occupy, or use a Corps Civil Works project?**

No, there are no federal projects in or near the Project.

## 11.8 Corps Wetland Policy

Does the Project propose to impact wetlands (33 CFR 320.4(b))?

Yes.

Based on the public interest review herein, do the beneficial effects of the Project outweigh the detrimental impacts of the Project?

Yes.

## 12 SPECIAL CONDITIONS

Are special conditions required to protect the public interest, ensure that effects are not significant, and/or ensure compliance of the activity with any of the laws above?

Yes.

### 12.1 Required Special Condition(s)

**Rationale:** The special conditions are established to ensure compliance with the Corps' authorization; ensure compliance with compensatory mitigation regulations (33 CFR 332); ensure the greatest potential for achieving compensatory mitigation success criteria; establish BMPs and Applicant-committed measures to minimize effect of the Project on the surrounding natural environment; maintain compliance with other state, local, and federal regulations.

1. The permittee will notify the Corps of Engineers, Galveston District, Regulatory Division, Chief of the Compliance Branch (Corps), in writing, the date in which construction (i.e. fill or structures) is to begin in the jurisdictional areas. The Corps must receive this notification prior to start of construction in the jurisdictional areas. The start of construction within jurisdictional areas shall trigger the aquatic resource mitigation requirements.
2. The aquatic resource mitigation success criteria, as indicated in the mitigation plan titled Harris Reservoir Expansion Project Compensatory Mitigation Plan, dated March 2023, must be achieved for the mitigation requirement to be considered complete.
3. Should aquatic resource mitigation be determined to be unsuccessful by Corps personnel at the end of the monitoring period, the permittee will be required to take necessary corrective measures, as approved by the Corps. Once the corrective measures are completed, the permittee will notify the Corps and a determination will be made regarding success of the mitigation.
4. The permittee shall adhere to the terms and conditions and fulfill all of their responsibilities as identified in the "Memorandum of Agreement between the U.S. Army Corps of Engineers, the Dow Chemical Company, and the Texas State Historic Preservation Officer Regarding Resolution of Adverse Effect to Site 41BO271, Brazoria County, Texas".

5. The permittee shall establish a 50-meter buffer surrounding site 41BO271. No ground disturbing project activities shall occur within the buffered zone other than the work described in the "Memorandum of Agreement between the U.S. Army Corps of Engineers, the Dow Chemical Company, and the Texas State Historic Preservation Officer Regarding Resolution of Adverse Effect to Site 41BO271, Brazoria County, Texas". The avoidance zone shall remain in action until the Corps has notified the permittee that the terms of the MOA have been fulfilled.
6. In order to avoid adverse effects to sites 41BO272, 41BO285, 41BO286, and the Quarles Cemetery the permittee shall adhere to the avoidance measures described in "Cultural Resources Avoidance and Minimization Plan for Three Sites, Harris Expansion Project" dated July 2020.
7. The permittee will comply with the avoidance and minimization measures described in the U.S. Fish and Wildlife Service's October 13, 2022, Informal Consultation Concurrence Letter.
8. The permittee understands and agrees that, if future operations by the United States require the removal, relocation, or other alteration, of the structure or work herein authorized, or if, in the opinion of the Secretary of the Army or his authorized representative, said structure or work shall cause unreasonable obstruction to the free navigation of the navigable waters, the permittee will be required, upon due notice from the Corps of Engineers, to remove, relocate, or alter the structural work or obstructions caused thereby, without expense to the United States. No claim shall be made against the United States on account of any such removal or alteration.
9. When structures or work authorized by this permit are determined by the District Engineer to have become abandoned, obstructive to navigation or cease to be used for the purpose for which they were permitted, such structures or other work must be removed, the area cleared of all obstructions, and written notice given to the Corps of Engineers, Galveston District, Regulatory Division, within 30 days of completion.

## **13 FINDINGS AND DETERMINATIONS**

### **13.1 Section 176(c) of the Clean Air Act General Conformity Rule Review**

The Project has been analyzed for conformity applicability pursuant to regulations implementing Section 176(c) of the Clean Air Act. It has been determined that the Project activities under this permit will not exceed de minimis levels of direct or indirect emissions of a criteria pollutant or its precursors and are exempted by 40 CFR 93.153. Any later indirect emissions are generally not within the Corps' continuing program responsibility and generally cannot be practicably controlled by the Corps. For these reasons, a conformity determination is not required for this permit action.

## **13.2 Presidential Executive Orders**

### **13.2.1 *Executive Order 13175 (Consultation and Coordination With Indian Tribal Governments)***

This action has no substantial effect on one or more Indian tribes or Alaska or Hawaiian natives.

### **13.2.2 *Executive Order 11988 (Floodplain Management)***

The evaluation of floodplain impacts, in accordance with 33 CFR 320.4(l) (Floodplain Management) and Executive Order 11988 (Floodplain Management), is conducted primarily through the alternatives analysis. The implementation of Executive Order 11988, as stated in 33 CFR 320.4(l)(3), requires that "the district engineer should avoid authorizing floodplain developments whenever practicable alternatives exist outside the floodplain. If there are no such practicable alternatives, the district engineer shall consider, as a means of mitigation, alternatives within the floodplain which will lessen any significant adverse impact to the floodplain."

The analysis in the FEIS includes an evaluation of practicable alternatives to the proposed Project that exist outside of the floodplain (Alternative 3), exist within the floodplain at an alternate location (Alternative 4), and exist on-site (Alternatives 2A and 2B). The FEIS also considers plans for proposed mitigation designed to lessen any significant adverse impact of the proposed Project, including the floodplain mitigation in Oyster Creek.

The Corps' evaluation of the floodplain impacts is in accordance with 33 CFR 320.4(l) and Executive Order 11988. Based on that review, the Corps advised the Applicant to expand their water surface elevation study, which is included in the FEIS. By conducting these studies on the proposed Project and evaluating multiple practicable alternatives, the Corps has complied with Executive Order 11988. The Corps will rely on the Brazoria County Floodplain Administrator to determine compliance with the provisions of the NFIP and the Brazoria County Development Regulations.

### **13.2.3 *Executive Order 12898 (Federal Actions To Address Environmental Justice in Minority Populations and Low-Income Populations)***

Based upon available information, the Corps has determined that portions of the proposed project within our federal control and responsibility would not have a disproportionately high and adverse human health or environmental effect on minority populations, low income populations, and/or disadvantaged communities historically marginalized or overburdened by pollution that may be present in the vicinity of the project. (see Section 4.10.4 of the FEIS.)

### **13.2.4 *Executive Order 13112 (Invasive Species)***

The evaluation provided in the FEIS and this ROD include invasive species concerns in the analysis of impacts at the Project site and associated compensatory mitigation projects.

**13.2.5 Executive Order 13212 (Actions To Expedite Energy-Related Projects) and Executive Order 13302 (Amending Executive Order 13212, Actions to Expedite Energy-Related Projects)**

The Project will not increase the production, transmission, or conservation of energy, or strengthen pipeline safety.

**13.2.6 Compliance with Section 404(b)(1) Guidelines**

Having completed the evaluation above, I have determined that the proposed discharge complies with the 404(b)(1) guidelines, with the inclusion of the appropriate and practicable special conditions to minimize pollution or adverse effects to the affected ecosystem.

**13.2.7 Public Interest Determination**

Having reviewed and considered the information in this ROD, I find that the proposed Project is not contrary to the public interest.

20 NOV 23

DATE

R. A. Blackmon

Rhett A. Blackmon  
Colonel, U.S. Army Corps of Engineers  
District Engineer

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